

Simplify each and state the excluded values.

$$1) \frac{35n-10}{50} = \frac{7n-2}{10}$$

no excluded

$$2) \frac{m^2-9}{m+3} = m-3$$

Excluded -3

$$3) \frac{n-9}{9n^2-81n} = \frac{1}{9n}$$

excluded 0, 9

$$4) \frac{30n^2}{20n+50} = \frac{3n^2}{2n+5} \quad \left\{ -\frac{5}{2} \right\}$$

Simplify each expression.

$$5) \frac{3m}{5m-4} - \frac{6}{m+4}$$

$$\frac{3m^2-18m+24}{(5m-4)(m+4)}$$

$$6) \frac{3a}{5a^2} - \frac{a+2}{a-5}$$

$$\frac{-7a-15-5a^2}{5a(a-5)}$$

$$7) \frac{4}{r-2} + \frac{3r}{2} = \frac{8+3r^2-6r}{2(r-2)}$$

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

$$= \frac{-2r^2+3r+9}{3(r+3)(r+1)}$$

$$9) 4 + \frac{x+1}{x^2+4x-32}$$

$$\frac{4x^2+17x-12}{(x-4)(x+8)}$$

$$10) \frac{7}{1-x} \cdot \frac{x^2-7x+6}{7}$$

$$-x+6$$

$$11) \frac{5k^2 + 45k}{k-3} \div \frac{k^2 + 19k + 90}{k-3} = \frac{5k}{k+10}$$

$$12) \frac{n^2 + 2n - 15}{n-2} \div \frac{n^2 + 2n - 15}{n+7} = \frac{n+7}{n-2}$$

$$13) \frac{v-9}{25v+10} \cdot \frac{25v+10}{8} = \frac{v-9}{8}$$

$$14) \frac{v^2 + 7v + 12}{v+5} \cdot \frac{v+5}{v+4} = v+3$$

$$15) \frac{1}{3x+3} \div \frac{8}{3x+6} = \frac{(x+2)}{8(x+1)}$$

$$16) \frac{35b-70}{6b} \cdot \frac{6b}{35b-70} = 1$$

$$17) \frac{\frac{x}{8} - \frac{x}{2}}{x^2} = \frac{2x^3}{16-x^3}$$

$$18) \frac{4}{\frac{5}{x+1} + \frac{x+1}{25}} = \frac{100x+100}{126+x^2+2x}$$

$$19) \frac{\frac{4}{x+3} + \frac{4}{x}}{\frac{1}{4}} = \frac{32x+48}{x^2+3x}$$

$$20) \frac{\frac{x}{4} + \frac{x^2}{4}}{16} = \frac{x+x^2}{64}$$

$$21) \frac{\frac{1}{2} + \frac{25}{x^2}}{\frac{1}{4} - \frac{25}{2}} = \frac{-2x^2 - 100}{49x^2}$$

$$22) \frac{\frac{a}{5} - \frac{a^2}{6}}{\frac{25}{9} + \frac{4}{15}} = \frac{18a - 15a^2}{274}$$

Solve each equation. Remember to check for extraneous solutions.

$$23) \frac{a+3}{2a} + \frac{1}{4a} = \frac{1}{2a}$$

$$a = -5\frac{1}{2}$$

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

$$x = 15$$

$$25) 7 + \frac{1}{n+8} = \frac{n-4}{n+8}$$

$$n = -6\frac{1}{6}$$

$$26) \frac{2}{p+4} + \frac{p-1}{p^2+4p} = \frac{2}{p}$$

$$p = 9$$

$$27) \frac{7}{x^2+3x-4} = \frac{1}{x^2+3x-4} - 1$$

$$x = -2, -1$$

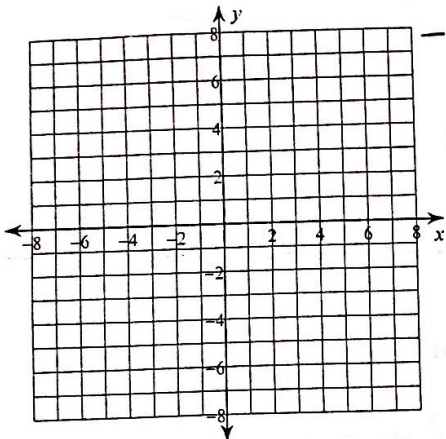
$$28) \frac{3n+9}{n^3-5n^2} = \frac{5}{n-5} + \frac{1}{n-5}$$

$$n = \frac{3}{2}, -1$$

Identify the holes, vertical asymptotes, x-intercepts, horizontal asymptote, and domain of each. Then sketch the graph.

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

$$-\frac{x+4}{(x^2+2x-8)} = -\frac{x+4}{(x+4)(x-2)} = \frac{1}{-(x-2)} = \frac{1}{-1(-4-2)}$$

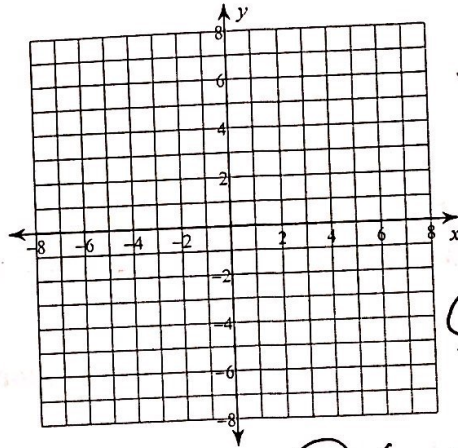


- into $(0, \frac{1}{2})$
 HA: $y=0$
 Oblique: none
 Domain: $(-\infty, -4) \cup (-4, 2) \cup (2, \infty)$
 hole $(-4, \frac{1}{6})$
 x-unt none
 VA: $x=2$

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

$$\frac{1}{4}x + 1$$

$$\frac{4x-4 \overline{) x^2+3x+2}}{\ominus x^2-x} \quad \frac{4x+2}{4x+2}$$

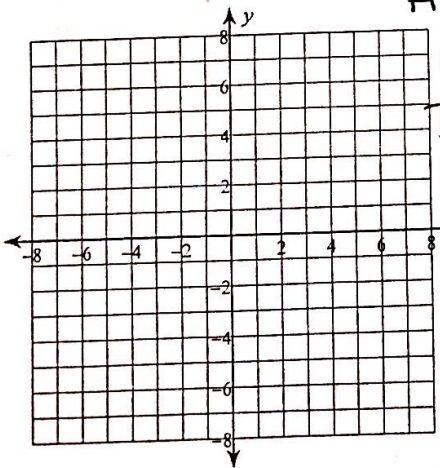


y-unt $(0, -\frac{1}{2})$
 HA: none
 O.A: $y = \frac{1}{4}x + 1$
 $\frac{(x+2)(x+1)}{4(x-1)}$
 D: $(-\infty, 1) \cup (1, \infty)$
 x-unt $(-2, 0) (-1, 0)$
 VA: $x=1$

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

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

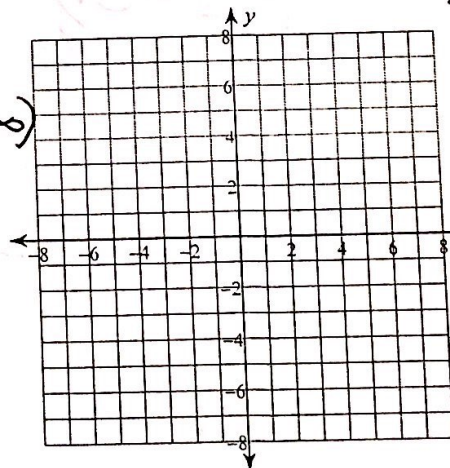
y-unt $(0, -\frac{4}{3})$
 HA: $y=1$



O.A none
 D: $(-\infty, -3) \cup (-3, \infty)$
 hole none
 x-unt $(4, 0)$
 VA $x=-3$

32) $f(x) = \frac{-x^2+3x}{x^2-7x+12}$

$$\frac{-x(x-3)}{(x-4)(x-3)} = \frac{-3}{3-4} = \frac{-3}{-1} = 3$$



y-unt $(0, 0)$
 HA: $y=-1$
 O.A: none
 hole $(3, 3)$
 VA $x=4$
 D: $(-\infty, 3) \cup (3, 4) \cup (4, \infty)$
 x-unt $(0, 0)$