Rational Simplify & Solving Worksheet

Pages 2 - 5 are the problems and answers

Pages 6 - 32 are problems worked out from class

Int. Trig Name_____

Simplify Rational Functions: Wks 1 Date_____ Period____

Simplify each expression.

1) $\frac{a-6b}{24ab} - \frac{a-4b}{24ab}$

$-\frac{1}{12a}$

2) $\frac{2}{20n^2} + \frac{m-3n}{20n^2}$

$\frac{2+m-3n}{20n^2}$

3) $\frac{x-2y}{15y^3x} + \frac{x+5y}{15y^3x}$

$\frac{2x+3y}{15y^3x}$

4) $\frac{x+5y}{15x} + \frac{x+6y}{15x}$

$\frac{2x+11y}{15x}$

5) $\frac{4}{6} + \frac{6}{3x}$

$\frac{2x+6}{3x}$

6) $\frac{3v}{3} - \frac{5}{4u}$

$\frac{4vu-5}{4u}$

7) $\frac{6x}{3} - \frac{4y}{2y}$

$2x-2$

8) $\frac{4n}{4m^2n} + \frac{3n}{3mn^2}$

$\frac{n+m}{m^2n}$

9) $\frac{3y}{6} - \frac{2y}{5y^2}$

$\frac{5y^2-4}{10y}$

10) $\frac{2}{5x} - \frac{3y}{2}$

$\frac{4-15yx}{10x}$

11) $\frac{k+5}{3k+3} - \frac{4k}{3k+3}$

$\frac{-3k+5}{3k+3}$

12) $\frac{x+5}{2x+6} + \frac{4x+1}{2x+6}$

$\frac{5x+6}{2x+6}$

13) $\frac{k+4}{k^2+3k+2}+\frac{2k+2}{k^2+3k+2}$

$\frac{3}{k+1}$

14) $\frac{3p-6}{5p^2-4p-12}+\frac{p-2}{5p^2-4p-12}$

$\frac{4}{5p+6}$

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

$\frac{-9x-36+6x^2}{(x-6)(2x-5)}$

16) $\frac{6}{2(r-6)}+\frac{5r}{3}$

$\frac{9+5r^2-30r}{3(r-6)}$

17) $\frac{2}{3}+\frac{5}{2b(b-5)}$

$\frac{4b^2-20b+15}{6b(b-5)}$

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

$\frac{2n+9}{3(n+3)}$

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

$\frac{5x+3}{3(x-3)}$

20) $\frac{6n}{n+2}+\frac{6n}{n+3}$

$\frac{12n^2+30n}{(n+3)(n+2)}$

21) $\frac{5v}{6}+\frac{6v+1}{v+4}$

$\frac{5v^2+56v+6}{6(v+4)}$

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

$\frac{10a+14}{3(a+1)}$

23) $\frac{4}{6k^2+30k}-\frac{4}{k+5}$

$\frac{2-12k}{3k(k+5)}$

24) $\frac{2}{x-3}-\frac{6x}{3x^2+15x}$

$\frac{16}{(x-3)(x+5)}$

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

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

26) $\frac{4}{3n-3}+\frac{4}{n-1}$

$\frac{16}{3(n-1)}$

Int. Trig Name_____

Solving Rational Functions: Wks 1 Date_____ Period____

Solve each equation. Remember to check for extraneous solutions.

1) $\frac{1}{x} + \frac{4x-12}{x} = 1$

$\left\{\frac{11}{3}\right\}$

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

$\{9\}$

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

$\{-3\}$

4) $\frac{2}{x} = \frac{x+6}{5x} + \frac{1}{5x}$

$\{3\}$

5) $\frac{3r-15}{r^2-4} = \frac{1}{r+2} + \frac{1}{r-2}$

$\{15\}$

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

$\{1\}$

7) $\frac{1}{x^2-x} - \frac{5x+30}{x^2-x} = \frac{1}{x-1}$

$\left\{-\frac{29}{6}\right\}$

8) $6 = \frac{3}{p-4} + \frac{p+5}{p-4}$

$\left\{\frac{32}{5}\right\}$

9) $\frac{3a+6}{a} = \frac{1}{a^2} - \frac{a+3}{a^2}$

$\left\{-2, -\frac{1}{3}\right\}$

10) $\frac{1}{3} + \frac{1}{x} = \frac{x+3}{x^2}$

$\{-3, 3\}$

11) $\frac{2}{a^2} = \frac{1}{4} - \frac{1}{4a^2}$

$\{3, -3\}$

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

$\left\{2, \frac{1}{3}\right\}$

13) $\frac{1}{x^2+5x} = \frac{1}{x+5} + \frac{6x-6}{x}$

$\left\{1, -\frac{31}{6}\right\}$

14) $\frac{1}{2v^2-8v+6} = \frac{1}{2} + \frac{1}{v-3}$

$\{0, 2\}$

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

$\{3, -4\}$

16) $\frac{1}{a} - \frac{6}{a^3+6a^2+8a} = \frac{1}{a+4}$

$\left\{-\frac{1}{2}\right\}$

5) $\dfrac{3r-15}{r^2-4} = \boxed{\dfrac{1}{r+2} + \dfrac{1}{r-2}}$

$$\frac{3r-15}{r^2-4} = \frac{r\boxed{-2}}{(r+2)(r-2)} + \frac{r\boxed{+2}}{(r+2)(r-2)}$$

$$\frac{3r-15}{r^2-4} = \frac{2r}{r^2-4}$$

$$\frac{\cancel{(r^2-4)}(3r-15)}{\cancel{(r^2-4)}} = \frac{\cancel{(r^2-4)}(2r)}{\cancel{(r^2-4)}}$$

$$3r-15 = 2r$$
$$-2r \qquad -2r$$
$$r-15 = 0$$
$$+15 \qquad +15$$
$$r = 15$$

*Restrict

$r^2-4=0$

$r^2=4$

$r \neq \pm 2$

$$\frac{3r-15}{r^2-4} = \boxed{\frac{2r}{r^2-4}}$$

$$\frac{3r-15}{r^2-4} - \frac{2r}{r^2-4} = 0$$

$$\frac{3r-15-2r}{r^2-4} = \frac{0}{1}$$

x-int

$$3r-15-2r=0$$

$$r-15=0$$

$$r=15$$

7) Simplify

$$\frac{1}{x^2-x} - \frac{(5x+30)}{x^2-x} = \frac{1}{x-1}$$

$$\frac{1-(5x+30)}{x^2-x}$$

$$\frac{1-5x-30}{x^2-x}$$

Solve

$$\cancel{\frac{(-5x-29)}{(x^2-x)} = \frac{1}{(x-1)}}$$

$$(-5x-29)(x-1) = (x^2-x)$$

$$-5x^2+5x-29x+29 = x^2-x$$

$$-5x^2-24x+29 = x^2-x$$

$$-x^2+x \qquad -x^2+x$$

$$-6x^2-23x+29=0$$

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{23 \pm \sqrt{(-23)^2-4(-6)(29)}}{2(-6)}$$

$$\frac{23 \pm \sqrt{529+696}}{-12}$$

$$\sqrt{1225} = 35$$

$$\frac{23 \pm \sqrt{1225}}{-12}$$

$$\frac{23 \pm 35}{-12} \Rightarrow \frac{23+35}{-12} =$$

$$\Rightarrow \frac{23-35}{-12} =$$

Simplify

7) $\frac{2\cancel{6}x}{1\cancel{3}} - \frac{2\cancel{4}\cancel{y}}{1\cancel{2}\cancel{y}}$

$\frac{2x}{1} - \frac{2}{1}$

Answer

$2x-2$

Best answer $2(x-1)$

a) $\frac{\cancel{18}^{1}y}{\cancel{6}_{2}} - \frac{2\cancel{y}}{5y^{\cancel{2}}}$

$\frac{y}{2} \quad \frac{2}{5y}$

$\frac{5y^2 - 4}{10y}$

$\frac{5y^2 - 4}{10y}$

$\frac{(k+5)}{3k+3} - \frac{4k}{3k+3}$

$\frac{k+5 - 4k}{3k+3}$

FACTOR

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

Factor

$\frac{(-3k+5)}{3(k+1)}$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solve

Simplify

$$\frac{3r-15}{r^2-4} = \frac{1}{(r+2)} + \frac{1}{(r-2)}$$

$$\frac{r-2 + r+2}{(r+2)(r-2)}$$ FOIL

$$\frac{(3r-15)}{(r^2-4)} = \frac{2r}{(r^2-4)}$$

$$\frac{(3r-15)\cancel{(r^2-4)}}{\cancel{(r^2-4)}} = \frac{\cancel{(r^2-4)}(2r)}{\cancel{(r^2-4)}}$$

$$3r-15=2r$$
$$-3r \qquad -3r$$

$$\frac{-15}{-1} = \frac{-r}{-1}$$

$$15 = r$$

* division

Restrictions

$r \neq$?

$r^2-4=0$

$r^2=4$

$r=\pm\sqrt{4}$

$r \neq \pm 2$

Simplify

$$\frac{3r-15}{r^2-4} = \frac{1}{(r+2)} + \frac{1}{(r-2)}$$

$$\frac{r-2 + r+2}{(r+2)(r-2)}$$

FOIL

$$\frac{(3r-15)}{(r^2-4)} = \frac{2r}{(r^2-4)}$$

* Solve

$$(3r-15)(r^2-4) = (r^2-4)2r$$

$$3r^3-12r-15r^2+60 = 2r^3-8r$$

$$-2r^3 \quad +8r \qquad\qquad -2r^3 \quad +8r$$

$$r^3-15r^2-4r+60=0$$

Choice

1. graph for x-int.
2. p/q
3. synthic division

$$\frac{3r-15}{r^2-4} = \frac{1}{r+2} + \frac{1}{r-2}$$

$$\frac{3r-15}{r^2-4} = \frac{2r}{r^2-4}$$

$$\frac{3r-15}{r^2-4} - \frac{2r}{r^2-4} = 0$$

x-int

$$\frac{3r-15-2r}{r^2-4} = 0$$

$$\frac{r-15}{r^2-4} = \frac{0}{1}$$

$r = 15$

$r \neq \pm 2$

$$\frac{1}{x^2-x} - \frac{(5x+30)}{x^2-x} = \frac{1}{x-1}$$

Simplify

① Denominators the same?

$$\frac{1 - (5x+30)}{x^2-x}$$

$$\frac{1-5x-30}{x^2-x}$$

$$\frac{(-5x-29)}{(x^2-x)} = \frac{1}{(x-1)}$$

Restrictions

$x \neq 0$

$x \neq 1$

$$(x-1)(-5x-29) = x^2-x$$

$$-5x^2-29x+5x+29 = x^2-x$$

$$-5x^2-24x+29 = x^2-x$$

$$-6x^2-23x+29=0$$

FACTOR

Quad. Formula

complet. the sq.

Simplify

3) $\frac{(x-2y)}{\boxed{15y^3x}} + \frac{(x+5y)}{\boxed{15y^3x}}$

① common denominator

SAME ?

same

$$\frac{x \boxed{-2y} + x \boxed{+5y}}{15y^3x}$$

$$\frac{2x+3y}{15y^3x}$$

5) $\frac{\cancel{4}\,2}{\cancel{6}\,3} + \frac{\cancel{6}\,2}{\cancel{3}\,1x}$

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

$\frac{2x+6}{3x}$

$\frac{x \cdot 4}{x \cdot 6} + \frac{6 \cdot 2}{3x \cdot 2}$

$\frac{4x}{6x} + \frac{12}{6x}$

$\frac{\cancel{4}_{2}x + \cancel{12}_{2}}{6x\cancel{2}}$

$\frac{2x+6}{3x}$ SAME $\frac{2x+6}{3x}$

a)

$$\frac{3y}{6} - \frac{2y}{5y^2}$$

$$\frac{15y^3 - 12y}{30y^2}$$

FACTOR

$$\frac{1\cancel{3}\cancel{y}(5y^2 - 4)}{10\cancel{30}y^{\cancel{2}}}$$

$$\frac{5y^2 - 4}{10y}$$

$$\frac{k+5-4k}{3k+3}$$

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

Solve

$$\frac{1}{x^2-x} - \frac{(5x+30)}{x^2-x} = \frac{1}{x-1}$$

① simplify

$$\frac{1-5x-30}{x^2-x}$$

$$\frac{(-5x-29)}{(x^2-x)} = \frac{1}{(x-1)}$$

$$(x-1)(-5x-29) = x^2-x$$

$$-5x^2 \boxed{-29x+5x} +29 = x^2-x$$

$$-24x$$

$$-x^2 \quad +x \qquad -x^2+x$$

$$-6x^2-23x+29=0$$

FACTOR

• Quad. Formula

Complete the square

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{-(-23) \pm \sqrt{(-23)^2-4(-6)(29)}}{2(-6)}$$

$$\frac{23 \pm \sqrt{529+696}}{-12}$$

$$\frac{23 \pm \sqrt{1225}}{-12}$$

$$\frac{23 \pm 35}{-12} \rightarrow \frac{23+35}{-12} = \frac{58}{-12} = \frac{-29}{6}$$

$$\rightarrow \frac{23-35}{-12} = \frac{-12}{-12} = 1$$

$$\frac{3k+6}{k^2+3k+2}$$

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

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

$$\frac{6x - 36 + 6x^2 - 15x}{(2x-5)(x-6)}$$

$6(-36)$

$$\frac{6x^2 - 9x - 36}{(2x-5)(x-6)}$$

Simplify

11) $\frac{(k+5)}{3k+3} - \frac{4k}{3k+3} = \frac{k+5-4k}{3k+3}$

$= \frac{(-3k+5)}{(3k+3)}$ answer

$3(k+1)$

Better answer

$\frac{(-3k+5)}{(3)(k+1)}$

$$\frac{(x+2y)+(x+5y)}{15y^3x}$$

$$\frac{2x+3y}{15y^3x}$$

7) $\frac{1}{x^2-x} - \frac{(5x+30)}{x^2-x} = \frac{1}{x-1}$

① Simplify

$\frac{1-5x-30}{x^2-x}$

$\frac{(-5x-29)}{(x^2-x)} = \frac{1}{(x-1)}$

$(x-1)(-5x-29) = x^2-x$

$-5x^2-29x+5x+29 = x^2-x$

$-5x^2-24x+29 = x^2-x$

$-x^2 \quad +x \qquad -x^2 \quad +x$

$ax^2 \quad +bx \quad +c$

$-6x^2-23x+29 = 0 \quad \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$\frac{-(-23) \pm \sqrt{(-23)^2-4(-6)(29)}}{2(-6)}$

$\frac{23 \pm \sqrt{529+696}}{-12}$

$\sqrt{1225} = 35$

$\frac{23 \pm \sqrt{1225}}{-12}$

$\frac{23 \pm 35}{-12} \Rightarrow \frac{23+35}{-12} \quad \frac{58}{-12} = \frac{29}{-6}$

$\frac{23-35}{-12} = 1$

$x = \frac{-29}{6} \quad x = 1$

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

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

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

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

$$x(-x+3) = (x^2+3x)(x-3)$$

$$\frac{(x)(-1)\cancel{(x-3)}}{\cancel{(x-3)}} = \frac{(x^2+3x)\cancel{(x-3)}}{\cancel{(x-3)}}$$

$$-x = x^2+3x$$

$$0 = x^2+3x+x$$

$$0 = x^2+4x$$

$$0 = x(x+4)$$

$$x = 0 \qquad x = -4$$

* Restriction

$x-3=0$

$x \neq 3$

15) $\frac{x+1}{x^2+3x} = \frac{\cancel{2}x-2}{x^2+3x} + \frac{x-3}{x}$

$- \frac{2x-2}{x^2+3x} \quad - \frac{\cancel{2x-2}}{\cancel{x^2+3x}}$

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

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

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

$x(-x+3) = (x^2+3x)(x-3)$

$-x^2+3x = x^3 \boxed{\cancel{-3x^2}+\cancel{3x^2}} - 9x$

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

$+x^2 \qquad +x^2$

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

$-3x \qquad -3x$

$0 = x^3+x^2-12x$

GCF

FACTOR

$0 = (x)(x^2+x-12)$

$x \neq 0$

$0 = x^2+x-12$

$0 = (x+4)(x-3)$

$x+4=0 \qquad x-3=0$

$x=-4 \qquad x=3$

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

$x \neq 0$

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

$$\frac{1}{a} - \frac{6}{a(a^2+6a+8)} = \frac{1}{(a+4)}$$

$$\frac{1}{a} \boxed{- \frac{6}{a(a+4)(a+2)}} = \frac{1}{(a+4)}$$

$$\frac{1}{a} = \frac{1}{a+4} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{1 \cdot a(a+2)}{(a+4) \cdot a(a+2)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{a(a+2)}{(a+4)a(a+2)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{a(a+2)+6}{a(a+4)(a+2)}$$

$$a(a+4)(a+2) = a(a(a+2)+6)$$

$$a(a^2+6a+8) = a(a^2+2a+6)$$

$$\cancel{a^3}+6a^2+8a = a^3+2a^2+6a$$

$$\cancel{-a^3}-2a^2-6a \quad -a^3-2a^2-6a$$

$$4a^2+2a = 0 \qquad \text{① GCF}$$

$$(2a)(2a+1) = 0$$

$$2a = 0 \qquad 2a+1 = 0$$

$$a = 0 \qquad a = -\frac{1}{2}$$

$-x+1$ FACTOR out -1 → Answer

$-1(x-1)$

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

$$-\frac{2x-2}{x^2+3x} \qquad -\frac{2x-2}{x^2+3x}$$

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

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

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

$(-x+3)$

$-1(x-3)$

$$x(-x+3) = (x-3)(x^2+3x)$$

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

$x \neq 3$

$$-x = x^2+3x$$

$$0 = x^2+4x$$

$$0 = x(x+4)$$

$x \neq 0$ $\quad x+4=0$

$x=-4$

$-x+1$ FACTOR out -1 → Answer

$-1(x-1)$

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

$$-\frac{2x-2}{x^2+3x} \qquad -\frac{2x-2}{x^2+3x}$$

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

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

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

$$x(-x+3) = (x-3)(x^2+3x)$$

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

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

$$-3x \qquad -3x$$

$$0 = x^3+x^2-12x$$

$$0 = x(x^2+x-12)$$

$x=0$

$$x^2+x-12=0$$

$$(x-3)(x+4)=0$$

$$x=3 \quad x=-4$$

$$\frac{1}{a} - \frac{6}{a^3+6a^2+8a} = \frac{1}{a+4}$$

Simplify
1) GCF
2) FACTOR
3) common denominator

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

$1 \cdot 8$
$2 \cdot 4 = 8$
$6 = 2+4$

$$\frac{1}{a} - \frac{6}{a(a+4)(a+2)} = \frac{1}{(a+4)}$$

Solve
① cross multiply

$$\frac{1}{a} = \frac{1}{(a+4)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{a \cdot 1 \cdot (a+2)}{a \cdot (a+4) \cdot (a+2)} + \frac{6}{a(a+4)(a+2)}$$

$a(a+2)$

$$\frac{1}{a} = \frac{a(a+2)+6}{a(a+4)(a+2)}$$

$$a(a+4)(a+2) = (a)(a(a+2)+6)$$

$$a(a^2+6a+8)$$

$$a^3+6a^2+8a = a(a^2+2a+6)$$

$$\cancel{a^3}+6a^2+8a = \cancel{a^3}+2a^2+6a$$

$-a^3$ $\quad$ $-a^3$

$$6a^2+8a = 2a^2+6a$$

$-2a^2$ $\quad$ $-2a^2$

$$4a^2+8a = 6a$$

$-6a$ $\quad$ $-6a$

$$4a^2+2a = 0$$

$$2a(2a+1) = 0$$

$2a = 0$ $\quad$ $2a+1 = 0$

$a = 0$ $\quad$ $a = -1/2$

10)

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

Restrictions

* $x \neq 0$

* $x \neq 0$

$$\frac{x+3}{3x} = \frac{x+3}{x^2}$$

$$\frac{3x\cancel{(x+3)}}{\cancel{(x+3)}} = \frac{x^2\cancel{(x+3)}}{\cancel{(x+3)}}$$

* Goal

like term = like term

$\rightarrow x+3=0$

$x=-3$

$3x = x^2$

$x^2 - 3x = 0$

$x(x-3)=0$

$x \neq 0$ $x=3$

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

$-\frac{1}{x}$ $-\frac{1}{x}$

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

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

$$\frac{1}{3} = \frac{3}{x^2}$$

$x^2 = 9$

$x = \pm 3$

$$3x(x+3) = x^2(x+3)$$

$$3x^2 + 9x = x^3 + 3x^2$$

$$x^3 - 9x = 0$$

$$x(x^2-9)=0$$

$x \neq 0$ $x^2 - 9 = 0$ $x = \pm\sqrt{9}$

$x = \pm 3$

$$\frac{1}{(a)} - \frac{6}{\boxed{a^3+6a^2+8a}} = \frac{1}{(a+4)}$$

FACTOR

$$a(a^2+6a+8)$$

$4+2 \quad 4\cdot 2$

$$a(a+4)(a+2)$$

$$\frac{1}{a} \boxed{- \frac{6}{a(a+4)(a+2)}} = \frac{1}{a+4}$$

$$+\frac{6}{a(a+4)(a+2)} \qquad +\frac{6}{a(a+2)(a+4)}$$

$$\frac{1}{a} = \frac{1}{(a+4)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{1}{(a+4)}\frac{(a)(a+2)}{(a)(a+2)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{a(a+2)}{a(a+4)(a+2)} + \frac{6}{a(a+4)(a+2)}$$

$$\frac{1}{a} = \frac{a(a+2)+6}{a(a+4)(a+2)}$$

a^2+2a+6

$$\frac{1}{a} = \frac{a(a+2)+6}{a(a+4)(a+2)}$$

$a(a^2+2a+4a+8)$

a^3+6a^2+8a

$$\frac{1}{a} = \frac{a^2+2a+6}{a^3+6a^2+8a}$$

$$a^3+6a^2+8a = a(a^2+2a+6)$$

$$a^3+6a^2+8a = a^3+2a^2+6a$$

$$-a^3 \qquad -a^3$$

$$6a^2+8a = 2a^2+6a$$

$$-2a^2 \qquad -2a^2$$

$$4a^2+8a = 6a$$

$$-6a \quad -6a$$

$$4a^2+2a = 0 \qquad *GCF$$

$$2a(2a+1) = 0$$

$2a = 0 \qquad 2a+1 = 0$

$a = 0 \qquad a = -1/2$

$$\frac{1}{a} - \frac{6}{a^3+6a^2+8a} = \frac{1}{a+4}$$

$1/0 - 1/0 = 1/4 \quad a \neq 0$

11) $\frac{2}{a^2} = \frac{1}{4} - \frac{1}{4a^2}$

$\frac{8}{4a^2} = \frac{1}{4} \boxed{- \frac{1}{4a^2}}$

$+\frac{1}{4a^2} \qquad +\frac{1}{4a^2}$

$\frac{8}{4a^2} + \frac{1}{4a^2} = \frac{1}{4}$

$\frac{9}{4a^2} = \frac{1}{4}$

$36 = 4a^2$

$9 = a^2$

$\pm 3 = a$

$\cancel{4} \cdot \frac{2}{\cancel{4}a^2} + \frac{1}{4a^2} = \frac{1}{4}$

$\frac{8}{4a^2} + \frac{1}{4a^2} = \frac{1}{4}$

letter = #

14) $\frac{1}{2v^2-8v+6} = \frac{1}{2} + \frac{1}{v-3}$

$-\frac{1}{v-3}$ $-\frac{1}{v-3}$

$2v^2-8v+6$

$2(v^2-4v+3)$

$1\cdot 3$

$-1\cdot -3$

$2(v-1)(v-3)$

$\frac{1}{(2v^2-8v+6)} - \frac{1}{(v-3)} = \frac{1}{2}$

$\frac{1}{\boxed{2(v-1)}(v-3)} - \frac{1\cdot 2(v-1)}{(v-3)\cdot 2(v-1)} = \frac{1}{2}$

$(2v-2)$

$\frac{1}{2(v-1)(v-3)} - \frac{1(2)(v-1)}{2(v-1)(v-3)} = \frac{1}{2}$

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

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

$2(-2v+3) = 1(2(v-1)(v-3))$

$2(v^2-3v-4v+3)$

v^2-4v+3

$-4v+6 = 2v^2-8v+6$

$+4v-6$ $+4v-6$

$0 = 2v^2-4v$

$0 = 2v(v-2)$

$2v=0$ $v-2=0$

15)

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

$(x-6)$ $(x-6)$ $(2x-5)$

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

$(6x-36)$ $(6x^2-15x)$

$$\frac{(6x-36)+(6x^2-15x)}{(x-6)(2x-5)}$$

$$\frac{6x^2-9x-36}{(x-6)(2x-5)}$$

$6x^2-9x-36$

$6(-36)$
$=-216$

216

2	108
3	72
12	18
8	27
4	54
6	36
9	24