

$$\begin{array}{ccc} & x & y \\ (1) & x + y = 10000 \end{array}$$

$$(2) \quad 0.05x + 0.072 \cdot y = 676 \quad 1.20$$

$$(2) \quad x + 1.44y = 13520$$

$$(2) - (1) \quad x + 1.44y - x - y = 13520 - 10000$$

$$0.44y = 3520$$

$$\underline{\underline{y = 8000}}$$

$$\underline{\underline{x = 2000}}$$

$$(1) x - y = 5$$

$$(2) x + 3y = 11$$

$$(1) - (2) \quad x - y - (x + 3y) = 5 - 11$$

$$-4y = -6$$

$$\underline{\underline{y = 1.5}}$$

$$(1) x - 1.5 = 5$$

$$\underline{\underline{x = 6.5}}$$

$$(2) \quad 3x + 4y = 2.1 \quad (1)$$

$$5x - 6y = 7.3 \quad (2)$$

$$(1) / 3 \quad x + \frac{4}{3}y = 0.7$$

$$x = 0.7 - \frac{4}{3}y$$

$$(2) \quad 5(0.7 - \frac{4}{3}y) - 6y = 7.3$$

$$3.5 - \frac{20}{3}y - 6y = 7.3$$

$$- \frac{38}{3}y = 3.8$$

$$x = 0.7 - \frac{4}{3}(-0.3)$$

$$\underline{\underline{y = -0.3}}$$

$$\underline{\underline{x = 1.1}}$$

2 linear eqs

2 unknown vars

- substitution

- elimination

Substitution

$$2x + 3y = 18$$

$$2x = 18 - 3y$$

$$x = 9 - 1.5y \rightarrow x = 9 - 1.5 \cdot 4$$

$$3x - 4y = -7$$

$$3(9 - 1.5y) - 4y = -7$$

$$27 - 4.5y - 4y = -7$$

$$-8.5y = -34$$

$$\underline{\underline{y = 4}}$$

$$x = 9 - 6$$

$$\underline{\underline{x = 3}}$$

$$2x + 3y = 18$$

$$3x - 4y = -7$$

Elimination

$$2x + 3y = 18 \quad | \cdot 1.5$$

$$(1) \quad 3x + 4.5y = 27$$

$$(2) \quad 3x - 4y = -7$$

$$(1) - (2) \quad \underline{3x} + 4.5y - \underline{3x} + 4y = 27 - (-7)$$

$$8.5y = 34$$

$$\underline{\underline{y = 4}}$$

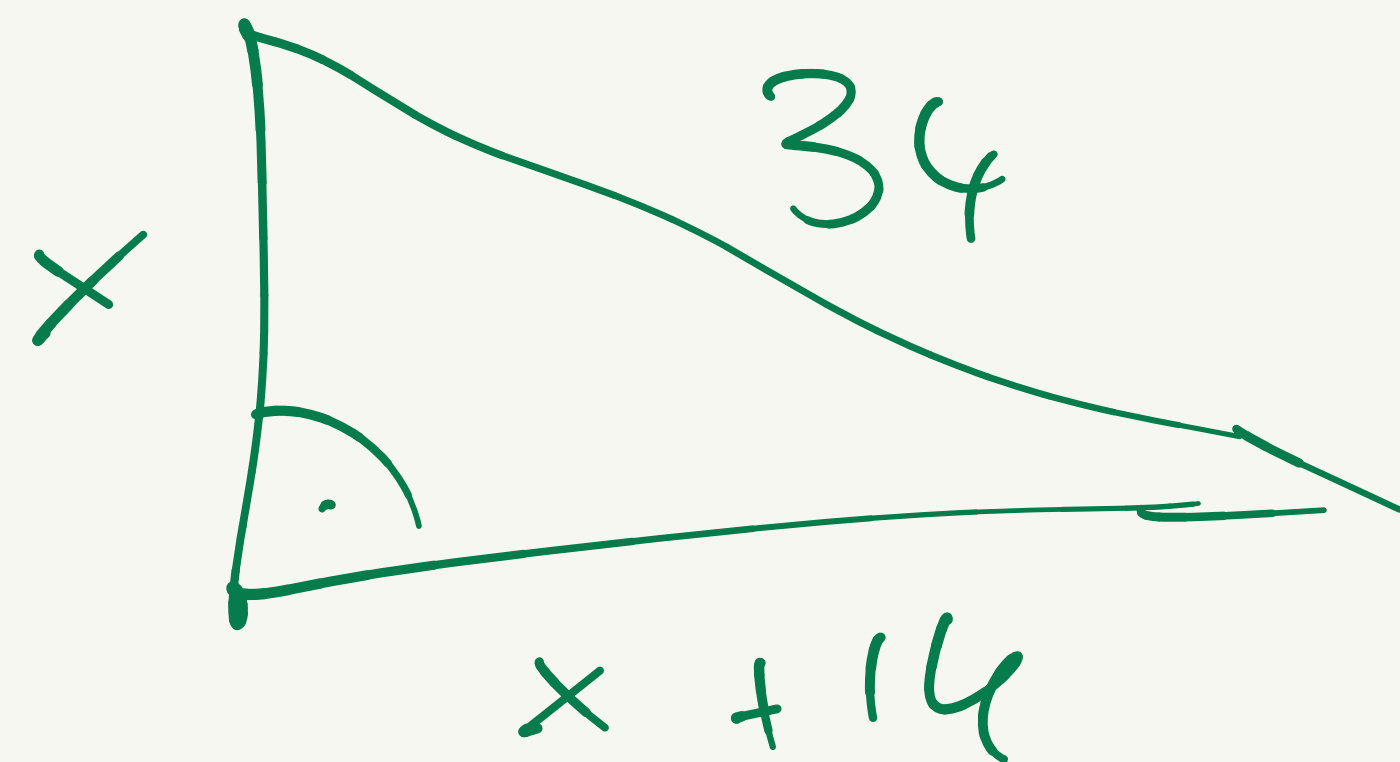
$$(2) \quad 3x - 4 \cdot 4 = -7$$

$$3x = -7 + 16$$

$$3x = 9$$

$$\Rightarrow \underline{\underline{x = 3}}$$

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$$34^2 = x^2 + (x+14)^2$$

$$34^2 = x^2 + x^2 + 28x + 14^2$$

$$0 = 2x^2 + 28x + 14^2 - 34^2$$

$$0 = 2x^2 + 28x + 196 - 1156$$

$$0 = 2x^2 + 28x - 960 \quad | : 2$$

$$0 = x^2 + 14x - 480 = (x+30)(x-16) \quad \begin{matrix} -30 \\ 16 \end{matrix}$$

$$x_{1,2} = \frac{-14 \pm \sqrt{14^2 - 4(1)(-480)}}{2} = \frac{-14 \pm \sqrt{196 + 1920}}{2} = \frac{-14 \pm 46}{2}$$

Quadratic equations

$$a \cdot x^2 + b \cdot x + c = 0$$

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

$$1) 15x - x^2 = 0$$

$$x(15-x) = 0$$

$$\boxed{x = 0}$$

$$15 - x = 0$$

$$\boxed{x = 15}$$

$$3) x^2 - 4x + 4 = 0$$

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

$$\underline{\underline{x = 2}}$$

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

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

$$x+3 = 0$$

$$\underline{\underline{x = -3}}$$

$$x-3 = 0$$

$$\underline{\underline{x = 3}}$$

$$4) x^2 - 5x + 6 = 0$$

$$(x-3)(x-2) = 0$$

$$\underline{\underline{x = 3}}$$

$$\underline{\underline{x = 2}}$$

$$(x+a)(x+b)$$

$$x^2 + (a+b)x + a \cdot b = 0$$

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x

$$\frac{2}{3}x + \frac{1}{6}x + 10000 = x$$

$$\frac{4}{4} \cdot \frac{2}{3}x + \frac{3}{3} \cdot \frac{1}{6}x + 10000 = x$$

$$\frac{8}{12}x + \frac{3}{12}x + 10000 = x$$

$$\frac{11}{12}x + 10000 = x$$

$$10000 = \frac{1}{12}x$$

$$\underline{\underline{120000 = x}}$$

$$/- \frac{11}{12}x$$

$$1. 12$$

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

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

$$1. x \neq 0$$

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

$$1. (x-2) \neq 0$$

$$x(x+2)-8 = 2(x-2)$$

$$x^2 + 2x - 8 = 2x - 4$$

$$1 - 2x$$

$$x^2 - 8 = -4$$

$$1 + 8$$

$$x^2 = 4$$

$$x = \pm \begin{array}{|c|} \hline 2 \\ \hline -2 \\ \hline \end{array}$$

$$x-2 = 0 \quad \checkmark$$

1.1

wage: x

$$38 \cdot x + 10 \cdot 2 \cdot x = 812$$

$$58x = 812$$

$$\underline{\underline{x = 14}}$$

1:58

2.1

$$6p - \frac{1}{2}(2p - 3) = 3(1 - p) - \frac{7}{6}(p + 2)$$

$$6p - p + 1.5 = 3 - 3p - \frac{7}{6}p - \frac{14}{6}$$

$$\begin{array}{l} + 3p + \frac{7}{6}p \\ - 1.5 \end{array}$$

$$\frac{55}{6}p = -\frac{5}{6}$$

$$\frac{55}{6}$$

$$p = -\frac{1}{11} = -\frac{5}{6} : \left| \frac{55}{6} \right| = -\frac{5}{6} \cdot \frac{6}{55} = -\frac{5}{55} = -\frac{1}{11}$$

Simple Equations

$$a = b$$

- +

- -

- •

- :

non-zero

non-zero

$$3x + 10 = x + 4$$

$$3x = x - 6$$

$$2x = -6$$

$$\underline{\underline{x = -3}}$$

$$1 - 10$$

$$1 - x$$

$$1 : 2$$

4)

$$\left(\frac{1}{4} - \frac{1}{5}\right)^{-2} = \left(\frac{1}{4} \cdot \frac{5}{5} - \frac{1}{5} \cdot \frac{4}{4}\right)^{-2} = \left(\frac{5}{20} - \frac{4}{20}\right)^{-2} =$$

$$= \left(\frac{1}{20}\right)^{-2} = 20^2 = \underline{\underline{400}}$$

3)

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

$$\frac{\frac{x+1+1}{(x-1)(x+1)}}{\frac{x(x+1)-2}{x+1}} = \frac{x+2}{(x-1)(x+1)} \cdot \frac{\cancel{x+1}}{x(x+1)-2} = \frac{x+2}{(x-1)[x(x+1)-2]}$$

$$1/ \frac{5}{7} + \frac{3}{7} - \frac{2}{7} = \frac{5+3-2}{7} = \frac{6}{7}$$

$$2/ \frac{1}{8ab} + \frac{1}{8b(a-2)} + \frac{1}{b \underbrace{(a^2-4)}} =$$

$$(a-2)(a+2)$$

$$\frac{1 \cdot (a-2)(a+2) - 1 \cdot a(a+2) + 8a}{8ab(a-2)(a+2)}$$

Adding fractions

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$$

$$\frac{a}{b} + \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{d} + \frac{c}{d} \cdot \frac{b}{b} = \frac{ad}{bd} + \frac{cb}{bd} = \frac{ad+cb}{bd}$$

Multiplying fractions

$$\frac{a}{c} \cdot \frac{b}{d} = \frac{ab}{cd}$$

$$\frac{a}{c} \div \frac{b}{d} = \frac{a}{c} \cdot \frac{d}{b} = \frac{ad}{cb}$$

\downarrow
 $\frac{d}{b}$

Reducing fractions

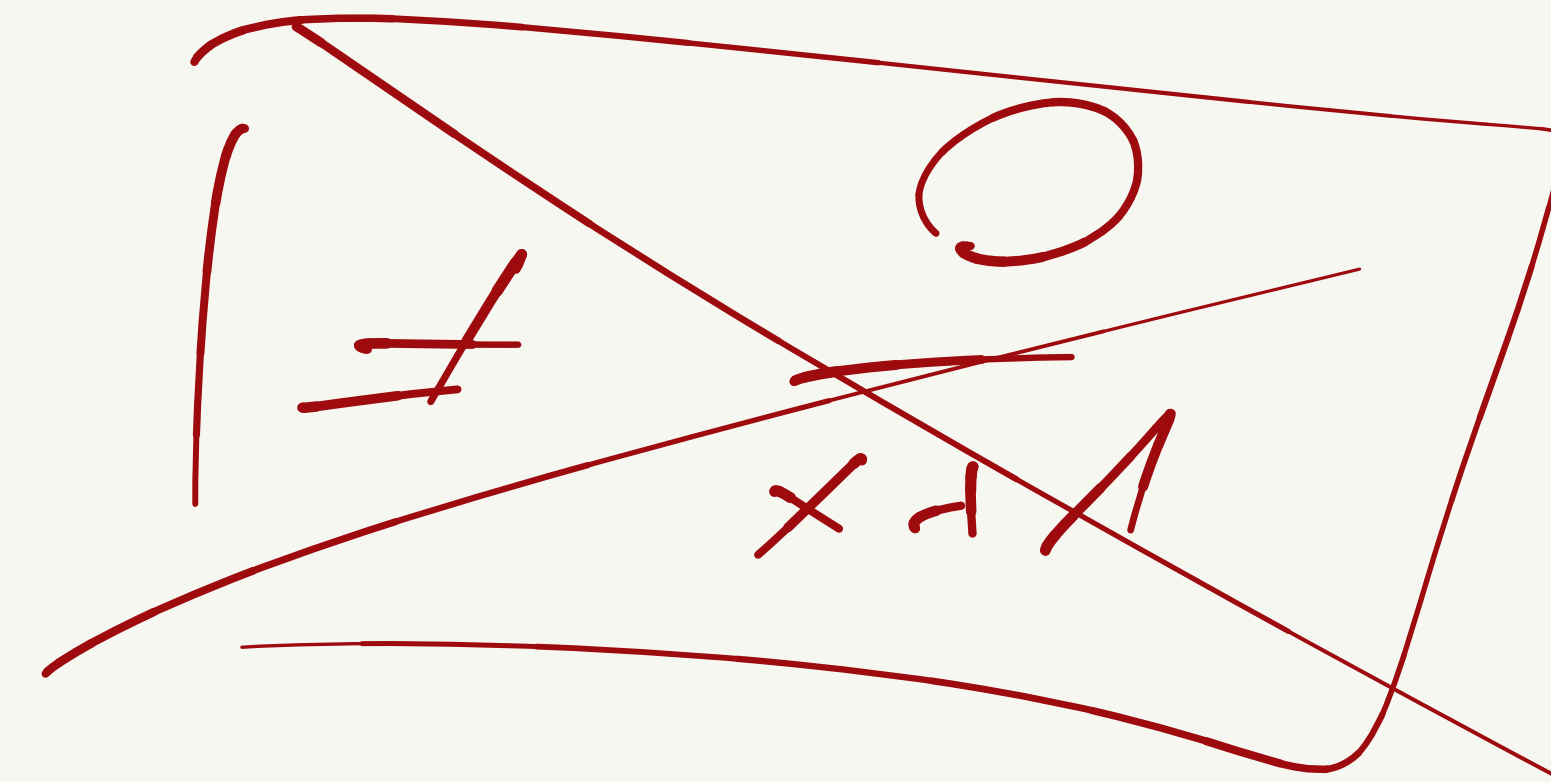
$$\frac{24}{36} = \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{3}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{3} \cdot 3} = \frac{2}{3}$$

$\frac{a}{b}$ \rightarrow numerator
 b \rightarrow denominator

$$\frac{\cancel{2}(3+5)}{\cancel{2}4} = \frac{3+5}{4}$$

$$\frac{2+4}{2+3} = 4$$

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



Fractions

$$a : b = \frac{a}{b}$$

$a < b$: proper fraction

$a \geq b$: improper fraction

$$\frac{15}{7} = 2 + \frac{1}{7} = \boxed{2 \frac{1}{7}} = 2.\frac{1}{7} = 2\frac{1}{7}$$

$$2.7$$
$$\boxed{2.7}$$

$$2) \quad -3(4 - 1 \cdot 2) = -3(4 + 2) = -3 \cdot 6 = \underline{\underline{-18}}$$

$$3) \quad \left(\frac{1}{2}x + \frac{1}{3}y\right)\left(\frac{1}{2}x - \frac{1}{3}y\right) = \left(\frac{1}{2}x\right)^2 - \left(\frac{1}{3}y\right)^2 =$$

$$= \frac{1}{4}x^2 - \frac{1}{9}y^2$$

$$1) \frac{1000^2}{252^2 - 248^2} = \frac{1000^2}{(252+248)(252-248)} =$$

$$= \frac{1000^2}{500 \cdot 4} = \frac{1000^2}{2000} =$$

$$= \frac{1000 \cdot \cancel{1000}}{2 \cdot \cancel{1000}} = \underline{\underline{500}}$$