Solving Equations

$x + 3 = 5$

$2 + y = 1$

$z - 3 = 2$

$1 - t = 6$

$3a = 2$

$\dfrac{b}{4} = 7$

$\sqrt[3]{L} = 5$

$3 + 2x = 12$

$\dfrac{4y + 3}{2} - 4 = 7$

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

$2 + 3p = 5p$

$\dfrac{2t}{t - 3} + 3 = \dfrac{6}{t - 3} \quad , (t \neq 3)$

$Y = AL^{3/4} K^{1/4}$, find K in terms of Y, A, L

$\dfrac{10(3 - z)}{17 - 4z} = \dfrac{5z - 4}{2z - 3}$

$\begin{cases} x^2 + 1 = 5 \\ 2 - 3x = 8 \end{cases}$

$\begin{cases} t(2t - 1) = 0 \\ 4t^2 + 2 = 3 \end{cases}$

Solving Equations

$$-3 \left(\begin{array}{c} x + 3 = 5 \end{array} \right) -3$$

$$x = 5 - 3$$

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

$$-2 \left(\begin{array}{c} 2 + y = 1 \end{array} \right) -2$$

$$y = 1 - 2$$

$$\underline{\underline{y = -1}}$$

$$+3 \left(\begin{array}{c} z - 3 = 2 \end{array} \right) +3$$

$$z = 2 + 3$$

$$\underline{\underline{z = 5}}$$

$$+t \left(\begin{array}{c} 1 - t = 6 \end{array} \right) +t$$

$$-6 \left(\begin{array}{c} 1 = 6 + t \end{array} \right) -6$$

$$1 - 6 = t$$

$$\underline{\underline{-5 = t}}$$

$$\div 3 \left(\begin{array}{c} 3a = 2 \end{array} \right) \div 3$$

$$a = \frac{2}{3}$$

$$\times 4 \left(\begin{array}{c} \dfrac{b}{4} = 7 \end{array} \right) \times 4$$

$$b = 7 \times 4$$

$$\underline{\underline{b = 28}}$$

$$\text{cube} \left(\begin{array}{c} \sqrt[3]{L} = 5 \end{array} \right) \text{cube}$$

$$L = 5^3$$

$$\underline{\underline{L = 125}}$$

Solving Equations

$$-3 \left(\; 3 + 2x = 12 \; \right) -3$$

$$2x = 12 - 3$$

$$\div 2 \left(\; 2x = 9 \; \right) \div 2$$

$$x = \frac{9}{2}$$

$$3 + 2\left(\frac{9}{2}\right) = 3 + 9 = 12 \checkmark$$

$$+4 \left(\; \frac{4y+3}{2} - 4 = 7 \; \right) +4$$

$$\times 2 \left(\; \frac{4y+3}{2} = 11 \; \right) \times 2$$

$$-3 \left(\; 4y + 3 = 22 \; \right) -3$$

$$\div 4 \left(\; 4y = 19 \; \right) \div 4$$

$$y = \frac{19}{4}$$

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

$$+3 \left(\; q - 3 = 0 \; \right) +3 \quad \text{or} \quad -4 \left(\; q + 4 = 0 \; \right) -4$$

$$q = 3 \qquad \text{or} \qquad q = -4$$

Solving Equations

$$2 + 3p = 5p$$

$-3p$ ... $-3p$

$$2 = 5p - 3p$$

$\div 2$ ... $2 = 2p$ ... $\div 2$

$$\underline{1 = p}$$

$$2 + 3 \times 1 = 5 \times 1 \checkmark$$

$$\frac{2t}{t-3} + 3 = \frac{6}{t-3} \quad , (t \neq 3)$$

$\times (t-3)$ ... $\times (t-3)$

$$2t + 3(t-3) = 6$$

$$2t + 3t - 9 = 6$$

$+9$ ... $5t - 9 = 6$ ... $+9$

$\div 5$ ... $5t = 15$ ... $\div 5$

$$t = 3 \qquad \underline{\text{no solutions}}!$$

$$Y = AL^{3/4} K^{1/4} \qquad \text{find } K \text{ in terms of } Y, A, L$$

$\div AL^{3/4}$ ... $\div AL^{3/4}$

$$\frac{Y}{AL^{3/4}} = K^{1/4}$$

$(\ )^4$ ... $(\ )^4$

$$\left(\frac{Y}{AL^{3/4}}\right)^4 = K$$

$$K = \left(\frac{Y}{AL^{3/4}}\right)^4 = \frac{Y^4}{(AL^{3/4})^4} = \frac{Y^4}{A^4 (L^{3/4})^4} = \frac{Y^4}{A^4 L^3}$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \ , \quad (ab)^n = a^n b^n \ , \quad (a^n)^m = a^{nm} \qquad \underline{K = \frac{Y^4}{A^4 L^3}}$$

$$\frac{a}{b} = \frac{c}{d} \iff ad = bc$$

Solving Equations

$$\frac{10(3-z)}{17-4z} = \frac{5z-4}{2z-3} \iff 10(3-z)(2z-3) = (5z-4)(17-4z)$$

$$10(6z - 9 - 2z^2 + 3z) = 85z - 20z^2 - 68 + 16z$$

$$-20z^2 + 90z - 90 = -20z^2 + 101z - 68$$

$+20z^2 \Big\lgroup \qquad\qquad\qquad\qquad\qquad \Big\rgroup +20z^2$

$$90z - 90 = 101z - 68$$

$-90z \Big\lgroup \qquad\qquad\qquad\qquad\qquad \Big\rgroup -90z$

$$-90 = 101z - 90z - 68$$

$$-90 = 11z - 68$$

$+68 \Big\lgroup \qquad\qquad\qquad\qquad\qquad \Big\rgroup +68$

$$-90 + 68 = 11z$$

$$-22 = 11z$$

$\div 11 \Big\lgroup \qquad\qquad\qquad\qquad\qquad \Big\rgroup \div 11$

$$-2 = z$$

Check

$$LHS = \frac{10(3-(-2))}{17-4(-2)} = \frac{10 \times 5}{17+8} = \frac{50}{25} = 2$$

$$RHS = \frac{5(-2)-4}{2(-2)-3} = \frac{-10-4}{-4-3} = \frac{-14}{-7} = \frac{14}{7} = 2$$

$$\begin{cases} x^2 + 1 = 5 \\ \boxed{2 - 3x = 8} \end{cases}$$

Solving Equations

$$x^2 + 1 = 5$$

$-1 \Big(\quad x^2 + 1 = 5 \quad \Big) -1$

$\pm\sqrt{\ } \Big(\quad x^2 = 4 \quad \Big) \pm\sqrt{\ }$

$\cancel{x = 2}$ or $x = -2$

$2 - 3x = 2 - 3 \times 2$
$= 2 - 6$
$= -4 \neq 8$

$2 - 3x = 2 - 3(-2)$
$= 2 + 6$
$= 8 \checkmark$

Solving Equations

$$\begin{cases} t(2t-1) = 0 \\ 4t^2 + 2 = 3 \end{cases}$$

$t = 0 ✗$ or $2t - 1 = 0$

$4t^2 + 2$
$= 4 \times 0^2 + 2$
$= 2 \neq 3$

$2t = 1$

$\boxed{t = \frac{1}{2}}$

$4t^2 + 2 = 4\left(\frac{1}{2}\right)^2 + 2$

$= 4\frac{1}{4} + 2 = 1 + 2 = 3 ✓$

$$\begin{cases} 2t^2 - t = 0 \\ 4t^2 + 2 = 3 \end{cases}$$

$$\begin{cases} 4t^2 - 2t = 0 \\ 4t^2 + 2 = 3 \end{cases}$$

$$\begin{cases} 4t^2 = 2t \\ 4t^2 = 1 \end{cases}$$

$2t = 1 \quad (= 4t^2)$

$\underline{\underline{t = \frac{1}{2}}}$