Solution *Section* 1.1 - Linear Equations and Rational Equations

Exercise

Solve: $5x-8=72$

Solution

$5x-8+8=72+8$

$5x=80$

$\underline{x=16}$

Exercise

Solve: $14-5x=-41$

Solution

$14-5x=-41$

$5x=14+41$

$5x=55$

$\underline{x=11}$

Exercise

Solve: $2x+6=3x-2$

Solution

$2x+6-3x-6=3x-2-3x-6$

$-x=-8$

$\underline{x=8}$

Exercise

Solve: $11x-(6x-5)=40$

Solution

$11x-6x+5=40$

$5x+5-5=40-5$

$5x=35$

$\underline{x=7}$

Exercise

Solve: $9x+11=7x+1$

Solution

$9x+11-7x-11=7x+1-7x-11$

$2x=-10$

$\underline{x=-5}$

Exercise

Solve: $2x-7=6+x$

Solution

$2x-7-x+7=6+x-x+7$

$\underline{x=13}$

Exercise

Solve: $5x-2=9x+2$

Solution

$5x-2-9x+2=9x+2-9x+2$

$-4x=4$

$\underline{x=-1}$

Exercise

Solve: $3(x-2)+7=2(x+5)$

Solution

$3x-6+7=2x+10$

$3x=9$

$\underline{x=3}$

Exercise

Solve: $3x+5-5(x+1)=6x+7$

Solution

$3x+5-5x-5=6x+7$

$-8x=7$

$\underline{x=-\frac{7}{8}}$

Exercise

Solve: $4(-2x+1) = 6-(2x-4)$

Solution

$-8x+4 = 6-2x+4$

$-6x = 6$

$\underline{x = -1}$

Exercise

Solve: $4(x+7) = 2(x+12)+2(x+1)$

Solution

$4x+28 = 2x+24+2x+2$

$4x-4x = 26-28$

$0 = -2$ ✗

No solution

Exercise

Solve: $6(3x-1) = 8-10(10x-14)$

Solution

$18x-6 = 8-100x+140$

$118x = 154$

$x = \frac{154}{118}$

$\underline{= \frac{77}{59}}$

Exercise

Solve: $5x-(2x-8) = 35$

Solution

$5x-2x+8 = 35$

$3x = 27$

$\underline{x = 9}$

Exercise

Solve: $\frac{1}{14}(3x-2)=\frac{x+10}{10}$

Solution

$\frac{1}{14}(3x-2)=\frac{x+10}{10}$

$(70)\frac{1}{14}(3x-2)=(70)\frac{x+10}{10}$

$5(3x-2)=7(x+10)$

$15x-10=7x+70$

$15x-7x=10+70$

$8x=80$

$\underline{x=10}$

Exercise

Solve: $\frac{5}{6}x-2x+\frac{4}{3}=\frac{5}{3}$

Solution

$6\times\ \frac{5}{6}x-2x+\frac{4}{3}=\frac{5}{3}$

$5x-12x+8=10$

$-7x=2$

$\underline{x=-\frac{2}{7}}$

Exercise

Solve: $\frac{7}{4}+\frac{1}{5}x-\frac{3}{2}=\frac{4}{5}x$

Solution

$20\times\ \frac{7}{4}+\frac{1}{5}x-\frac{3}{2}=\frac{4}{5}x$

$35+4x-30=16x$

$5=12x$

$\underline{x=\frac{5}{12}}$

Exercise

Solve: $5(x+3)+4x-3=-(2x-4)+2$

Solution

$5x+15+4x-3=-2x+4+2$

$9x+12=-2x+6$

$9x+12+2x-12=-2x+6+2x-12$

$11x=-6$

$\boxed{x=-\frac{6}{11}}$

Exercise

Solve: $2\left[x-(4+2x)+3\right]=2x+3$

Solution

$2x-2(4+2x)+6=2x+3$

$2x-8-4x+6=2x+3$

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

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

$-4x=5$

$\boxed{x=-\frac{5}{4}}$

Exercise

Solve: $2x-\left\{x-\left[3x-(8x+6)\right]\right\}=2x-2$

Solution

$2x-x+\left[3x-(8x+6)\right]=2x-2$ ***Distribute the minus***

$2x-x+3x-(8x+6)=2x-2$ ***Distribute the plus***

$2x-x+3x-8x-6=2x-2$ ***Distribute the minus***

$-4x-6=2x-2$

$-4x-2x-6+6=2x-2x-2+6$

$-6x=4$ ***Divide by –6***

$x=\frac{4}{-6}$

$\boxed{=-\frac{2}{3}}$

Exercise

Solve: $4(2x+7)=2x+22+3(2x+3)$

Solution

$8x+28=2x+22+6x+9$
$8x+28=8x+31$
$8x+28-8x=8x+31-8x$
$28=31$ *False statement*
No Solution

Exercise

Solve: $4\left[2x-(3-x)+5\right]=-7x-2$

Solution

$8x-4(3-x)+20=-7x-2$
$8x-12+4x+20=-7x-2$
$12x-8=-7x-2$
$12x-8+7x+8=-7x-2+7x+8$
$19x=6$
$\boxed{x=\frac{6}{19}}$

Exercise

Solve: $3\left[2x-(4-x)+5\right]=7x-2$

Solution

$6x-3(4-x)+15=7x-2$
$6x-12+3x+15=7x-2$
$9x+3=7x-2$
$2x=-5$
$\boxed{x=-\frac{5}{2}}$

Exercise

Solve: $-4(2x-6)+8x=5x+24+x$

Solution

$-8x+24+8x=6x+24$
$6x=0$

$\underline{x = 0}$

Exercise

Solve: $-8(3x+4)+6x = 4(x-8)+4x$

Solution

$-24x - 32 + 6x = 4x - 32 + 4x$

$-18x = 8x$

$26x = 0$

$\underline{x = 0}$

Exercise

Solve: $4(x+7) = 2(x+12)+2(x+1)$

Solution

$4x + 28 = 2x + 24 + 2x + 2$

$4x + 28 = 4x + 26$

$4x - 4x = 26 - 28$

$0 = -2$ (*False*)

Solution: $\{\varnothing\}$

Exercise

Solve: $-6(2x+1)-3(x-4) = -15x+1$

Solution

$-12x - 6 - 3x + 12 = -15x + 1$

$-15x + 6 = -15x + 1$

$6 = 1$ *False statement*

No Solution

Exercise

Solve: $2(x-1)+3 = x-3(x+1)$

Solution

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

$2x + 1 = -2x - 3$

$4x = -4$

$\underline{x = -1}$

Exercise

Solve: $3(x-4)-4(x-3)=x+3-(x-2)$

Solution

$3x-12-4x+12=x+3-x+2$

$-x=5$

$\underline{x=-5}$

Exercise

Solve: $2-(7x+5)=13-3x$

Solution

$2-7x-5=13-3x$

$-7x-3=13-3x$

$-4x=16$

$\underline{x=-4}$

Exercise

Solve: $16=3(x-1)-(x-7)$

Solution

$16=3x-3-x+7$

$16=2x+4$

$2x=12$

$\underline{x=6}$

Exercise

Solve: $5x-2(x+1)=x+(3x-5)$

Solution

$5x-2x-2=x+3x-5$

$3x-2=4x-5$

$-x=-3$

$\underline{x=3}$

Exercise

Solve: $7(x+1)=4\left[x-(3-x)\right]$

Solution

$7x+7=4x-4(3-x)$

$3x=-7-12+4x$

$-x=-19$

$x=19$

Exercise

Solve: $2\left[3x-2(2x-3)\right]=5(x-6)$

Solution

$6x-4(2x-3)=5x-30$

$6x-8x+12=5x-30$

$-2x-5x=-42$

$-7x=-42$

$x=6$

Exercise

Solve: $.2x-.5=.1x+7$

Solution

$10\times\quad .2x-.5=.1x+7$

$2x-5=x+70$

$x=75$

Exercise

Solve: $.01x+3.1=2.03x-2.96$

Solution

$100\times\quad .01x+3.1=2.03x-2.96$

$x+310=203x-296$

$202x=606$

$x=\frac{606}{202}$

$=3$

Exercise

Solve: $.08x - .06(x + 12) = 7.72$

Solution

$100\times \quad .08x - .06(x + 12) = 7.72$

$8x - 6(x + 12) = 772$

$8x - 6x - 72 = 772$

$2x = 700$

$\underline{x = 350}$

Exercise

Solve: $.04(x - 12) + .06x = 1.52$

Solution

$100\times \quad .04(x - 12) + .06x = 1.52$

$4(x - 12) + 6x = 152$

$4x - 48 + 6x = 152$

$10x = 200$

$\underline{x = 20}$

Exercise

Solve: $.3(x + 2) - .5(x + 2) = -.2x - .4$

Solution

$10\times \quad .3(x + 2) - .5(x + 2) = -.2x - .4$

$3(x + 2) - 5(x + 2) = -2x - 4$

$3x + 6 - 5x - 10 = -2x - 4$

$-2x - 4 = -2x - 4$

$0 = 0$ *True statement*

Solution: $\mathbb{R}$

Exercise

Solve: $.6(x - 5) + .8(x - 6) = .2x - 1.8$

Solution

$10\times \quad .6(x - 5) + .8(x - 6) = .2x - 1.8$

$$6(x-5)+8(x-6)=2x-18$$

$$6x-30+8x-48=2x-18$$

$$14x-78=2x-18$$

$$12x=60$$

$$\underline{x=5}$$

Exercise

Solve: $.5x+\frac{4}{3}x=x+10$

Solution

$$30\times\quad .5x+\frac{4}{3}x=x+10$$

$$15x+40x=30x+300$$

$$55x=30x+300$$

$$25x=300$$

$$x=\frac{300}{25}$$

$$\underline{x=12}$$

Or

$$\frac{1}{2}x+\frac{4}{3}x=x+10$$

$$6\times\quad \frac{1}{2}x+\frac{4}{3}x=x+10$$

$$3x+8x=6x+60$$

$$5x=60$$

$$\underline{x=12}$$

Exercise

Solve: $.25x+\frac{2}{3}x=x+2$

Solution

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

$$12\times\quad \frac{1}{4}x+\frac{2}{3}x=12x+24$$

$$3x+8x=12x+24$$

$$-x=24$$

$$\underline{x=-24}$$

Exercise

Solve: $\frac{1}{4}(x-2)=\frac{1}{6}(x-5)$

Solution

$6(x-2)=4(x-5)$

$6x-12=4x-20$

$2x=-8$

$\underline{x=-4}$

Exercise

Solve: $\frac{1}{4}(3x-2)=\frac{1}{5}(x+5)$

Solution

$5(3x-2)=4(x+5)$

$15x-10=4x+20$

$11x=30$

$\underline{x=\frac{30}{11}}$

Exercise

Solve: $\frac{1}{9}(x+2)=\frac{1}{15}(2x+5)$

Solution

$15(x+2)=9(2x+5)$

$15x+30=18x+45$

$3x=-15$

$\underline{x=-5}$

Exercise

Solve: $\frac{1}{2}(4x+8)-16=-\frac{2}{3}(9x-12)$

Solution

$6\times\ \frac{1}{2}(4x+8)-16=-\frac{2}{3}(9x-12)$

$3(4x+8)-96=-4(9x-12)$

$12x+24-96=-36x+48$

$$12x + 36x = 48 + 72$$
$$48x = 120$$
$$x = \frac{120}{48}$$
$$= \boxed{\frac{5}{2}}$$

Exercise

Solve: $\frac{3}{4}(24 - 8x) - 16 = -\frac{2}{3}(6x - 9)$

Solution

$$12 \times \quad \frac{3}{4}(24 - 8x) - 16 = -\frac{2}{3}(6x - 9)$$
$$9(24 - 8x) - 192 = -8(6x - 9)$$
$$216 - 72x - 192 = -48x + 72$$
$$24x = 24 - 72$$
$$24x = -48$$
$$\boxed{x = -2}$$

Exercise

Solve: $\frac{x-3}{4} = \frac{5}{14} - \frac{x+5}{7}$

Solution

$$(28)\frac{x-3}{4} = (28)\frac{5}{14} - (28)\frac{x+5}{7} \qquad LCD: 4 \quad 14 \quad 7 \rightarrow 28$$
$$7(x - 3) = 2(5) - 4(x + 5)$$
$$7x - 21 = 10 - 4x - 20$$
$$7x + 4x = 21 - 10$$
$$11x = 11$$
$$\boxed{x = 1}$$

Exercise

Solve: $\frac{x+1}{4} = \frac{1}{6} + \frac{2-x}{3}$

Solution

$$12\frac{x+1}{4} = 12\frac{1}{6} + 12\frac{2-x}{3}$$

$3(x+1) = 2 + 4(2-x)$

$3x + 3 = 2 + 8 - 4x$

$3x + 4x = 2 + 8 - 3$

$7x = 7$

$\underline{x = 1}$

Exercise

Solve $\frac{x-8}{3} + \frac{x-3}{2} = 0$

Solution

$(6)\frac{x-8}{3} + (6)\frac{x-3}{2} = 0(6)$ ***LCD:* 2, 3: 6**

$2(x-8) + 3(x-3) = 0$

$2x - 16 + 3x - 9 = 0$

$5x - 25 = 0$

$5x = 25$

$\underline{x = 5}$

Exercise

Solve: $\frac{5}{2x} - \frac{8}{9} = \frac{1}{18} - \frac{1}{3x}$

Solution

***Restriction:* $x \neq 0$**

$18x\frac{5}{2x} - 18x\frac{8}{9} = 18x\frac{1}{18} - 18x\frac{1}{3x}$ $2x \quad 9 \quad 18 \quad 3x \quad \rightarrow 18x$

$9(5) - 2x(8) = x - 6$

$45 - 16x = x - 6$

$45 + 6 = x + 16x$

$51 = 17x$

$x = \frac{51}{17}$

$\underline{= 3}$

Exercise

Solve: $\frac{1}{x+4} + \frac{1}{x-4} = \frac{22}{x^2-16}$

Solution

Restrictions: $x \neq \pm 4$

$$(x+4)(x-4)\frac{1}{x+4}+(x+4)(x-4)\frac{1}{x-4}=(x+4)(x-4)\frac{22}{x^2-16}$$

$$x-4+x+4=22$$

$$2x=22$$

$$\underline{\boxed{x=11}}$$

Exercise

Solve: $\dfrac{3x-1}{3}-\dfrac{2x}{x-1}=x$

Solution

Condition (Restriction): $x-1\neq 0 \Rightarrow x\neq 1$

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

$$3x^2-x-3x+1-6x=3x^2-3x$$

$$3x^2-x-3x+1-6x-3x^2+3x=0$$

$$-7x+1=0$$

$$-7x=-1$$

$$\underline{\boxed{x=\frac{1}{7}}}$$

Exercise

Solve: $\dfrac{x}{x-2}=\dfrac{2}{x-2}+2$

Solution

Restriction: $x-2\neq 0 \Rightarrow x\neq 2$

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

$$x=2+2x-4$$

$$-x=-2$$

$$x=2$$

$\Rightarrow$ No *Solution* or $\{\varnothing\}$ because of the restriction.

Exercise

Solve the equation $\frac{x}{x-7}=\frac{7}{x-7}+8$

Solution

Restriction: $x-7\neq 0 \Rightarrow \boxed{x\neq 7}$

$(x-7)\frac{x}{x-7}=(x-7)\frac{7}{x-7}+8(x-7)$

$x=7+8x-56$

$x-8x=-49$

$-7x=-49$

$x=\frac{-49}{-7}=7$

But $x\neq 7$ (restriction), therefore there is ***no solution***

Exercise

Solve: $\frac{3x}{5}-x=\frac{x}{10}-\frac{5}{2}$

Solution

$10\times \quad \frac{3x}{5}-x=\frac{x}{10}-\frac{5}{2}$

$6x-10x=x-25$

$-4x=x-25$

$-5x=-25$

$x=5$

Exercise

Solve: $2x-\frac{2x}{7}=\frac{x}{2}+\frac{17}{2}$

Solution

$\frac{14x-2x}{7}=\frac{x+17}{2}$

$\frac{12x}{7}=\frac{x+17}{2}$

$24x=7x+119$

$17x=119$

$x=7$

Exercise

Solve: $\frac{x+3}{6} = \frac{2}{3} + \frac{x-5}{4}$

Solution

$12\times \quad \frac{x+3}{6} = \frac{2}{3} + \frac{x-5}{4}$

$2x+6 = 8+3x-15$

$2x-3x = 8-15-6$

$-x = -13$

$\underline{x = 13}$

Exercise

Solve: $\frac{x+1}{4} = \frac{1}{6} + \frac{2-x}{3}$

Solution

$12\times \quad \frac{x+1}{4} = \frac{1}{6} + \frac{2-x}{3}$

$3x+3 = 2+8-4x$

$7x = 7$

$\underline{x = 1}$

Exercise

Solve: $\frac{x}{4} = 2 + \frac{x-3}{3}$

Solution

$12\times \quad \frac{x}{4} = 2 + \frac{x-3}{3}$

$3x = 24-4x-12$

$7x = 12$

$\underline{x = \frac{12}{7}}$

Exercise

Solve: $5 + \frac{x-2}{3} = \frac{x+3}{8}$

Solution

$24\times \quad 5 + \frac{x-2}{3} = \frac{x+3}{8}$

$120+8x-16 = 3x+9$

$5x = 9 - 104$

$5x = -95$

$\underline{x = -19}$

Exercise

Solve: $\frac{x+1}{3} = 5 - \frac{x+2}{7}$

Solution

$21\times \quad \frac{x+1}{3} = 5 - \frac{x+2}{7}$

$7x + 7 = 105 - 3x - 6$

$10x = 92$

$\underline{x = \frac{46}{5}}$

Exercise

Solve: $\frac{3x}{5} - \frac{x-3}{2} = \frac{x+2}{3}$

Solution

$30\times \quad \frac{3x}{5} - \frac{x-3}{2} = \frac{x+2}{3}$

$18x - 15x + 45 = 10x + 20$

$3x - 10x = 20 - 45$

$-7x = -25$

$\underline{x = \frac{25}{7}}$

Exercise

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

Solution

Restriction: $\begin{cases} x - 2 \neq 0 \Rightarrow x \neq 2 \\ x \neq 0 \end{cases}$

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

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

$3x^2 + 3x = 0$

$3x(x+1)=0$

$3x=0 \qquad x+1=0$

$x=0 \qquad x=-1$

$\boxed{x=-1}$ is the only solution

Exercise

Solve: $\dfrac{-4x}{x-1}+\dfrac{4}{x+1}=\dfrac{-8}{x^2-1}$

Solution

Restriction: $x\neq\pm1$

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

$-4x(x+1)+4(x-1)=-8$

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

$-4x^2=-4$

$x^2=1$

$x=\pm1$ The solution is $\{\varnothing\}$

Exercise

Solve: $\dfrac{4x+3}{x+1}+\dfrac{2}{x}=\dfrac{1}{x^2+x}$

Solution

Restriction: $x+1\neq0 \rightarrow \underline{x\neq-1,\ 0}$

$x(x+1)\dfrac{4x+3}{x+1}+x(x+1)\dfrac{2}{x}=x(x+1)\dfrac{1}{x^2+x}$

$x(4x+3)+2(x+1)=1$

$4x^2+3x+2x+2=1$

$4x^2+5x+2-1=1-1$

$4x^2+5x+1=0$

$(4x+1)(x+1)=0$

$4x+1=0 \qquad x+1=0$

$\underline{x=-\dfrac{1}{4}} \qquad \cancel{x=-1}$

Exercise

Solve: $\dfrac{6}{x+3}-\dfrac{5}{x-2}=\dfrac{-20}{x^2+x-6}$

Solution

$\dfrac{6}{x+3}-\dfrac{5}{x-2}=\dfrac{-20}{x^2+x-6}$ ***Restriction***: $x \neq -3, 2$

$(x+3)(x-2)\dfrac{6}{x+3}-(x+3)(x-2)\dfrac{5}{x-2}=(x+3)(x-2)\dfrac{-20}{x^2+x-6}$

$6(x-2)-5(x+3)=-20$

$6x-12-5x-15=-20$

$x=-20+12+15$

$\underline{x=7}$

Exercise

Solve: $\dfrac{6}{x+1}-\dfrac{5}{x+2}=\dfrac{10}{x^2+3x+2}$

Solution

Restriction: $x \neq -1, -2$

$6(x+2)-5(x+1)=10$

$6x+12-5x-5=10$

$\underline{x=3}$

Exercise

Solve: $3(x-4)-5(x+2)=3\left[2-(x+24)\right]-2(x-2)$

Solution

$3x-12-5x-10=6-3(x+24)-2x+4$

$-2x-22=-3x-72-2x+10$

$3x=-62+22$

$3x=-42$

$\underline{x=-14}$

Exercise

Solve: $(2x+3)(6x-1)-9=15x^2-(3x-2)(x-2)$

Solution

$$12x^2+16x-3-9=15x^2-\left(3x^2-8x+4\right)$$

$$12x^2+16x-12=15x^2-3x^2+8x-4$$

$$12x^2+16x-8x=12x^2-4+12$$

$$8x=8$$

$$\underline{x=1}$$

Exercise

Solve: $(3x-1)^2-2x(x-1)=7x^2-5x+2$

Solution

$$9x^2-6x+1-2x^2+2x=7x^2-5x+2$$

$$7x^2-4x+1=7x^2-5x+2$$

$$\underline{x=1}$$

Exercise

Solve: $(2x+3)(x-1)+(x+1)(x-4)=3x^2$

Solution

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

$$3x^2-2x-7=3x^2$$

$$2x=7$$

$$\underline{x=\frac{7}{2}}$$

Exercise

Solve: $4x+13-\{2x-[4(x-3)-5]\}=2(x-6)$

Solution

$$4x+13-2x+4(x-3)-5=2x-12$$

$$2x+8+4x-12=2x-12$$

$$4x=-8$$

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

Exercise

Solve: $-2\{7-[4-2(1-x)+3]\}=10-[4x-2(x-3)]$

Solution

$-14+2[7-2+2x]=10-4x+2x-6$

$-14+2(5+2x)=2-2x$

$-14+10+4x=2-2x$

$6x=6$

$\underline{x=1}$

Exercise

Solve: $2(y+2)+(y+3)^2=y(y+5)+2\left(\frac{17}{2}+y\right)$

Solution

$2y+4+y^2+6y+9=y^2+5y+17+2y$

$8y+13=7y+17$

$\underline{y=4}$

Exercise

Solve: $(y+1)(y-1)=(y+2)(y-3)+4$

Solution

$y^2-1=y^2-y-6+4$

$-1=-y-2$

$\underline{y=-1}$

Exercise

Solve: $45-[4-2y-4(y+7)]=-4(1+3y)-[4-3(y+2)-2(2y-5)]$

Solution

$45-[4-2y-4y-28]=-4-12y-[4-3y-6-4y+10]$

$45-4+2y+4y+28=-4-12y-4+3y+6+4y-10$

$69+6y=-12-5y$

$6y+5y=-12-69$

$11y = -81$

$\boxed{y = -\frac{81}{11}}$

Exercise

Solve: $35 - \left[2 - 3y - 4(y+7)\right] = -3(1+3y) + 4 - 3(y+2) - 2(2y-5)$

Solution

$35 - 2 + 3y + 4(y+7) = -33 - 9y + 4 - 3y - 6 - 4y + 10$

$33 + 3y + 4y + 28 = -25 - 16y$

$61 + 7y = -25 - 16y$

$23y = -86$

$\boxed{y = -\frac{86}{23}}$

Exercise

Solve: $25 - \left[2 + 5y - 3\left(y+2\right)\right] = -3\left(2y-5\right) - \left[5\left(y-1\right) - 3y + 3\right]$

Solution

$25 - \left[2 + 5y - 3y - 6\right] = -6y + 15 - \left[5y - 5 - 3y + 3\right]$

$25 - \left(2y - 4\right) = -6y + 15 - \left(2y - 2\right)$

$25 - 2y + 4 = -6y + 15 - 2y + 2$

$-2y + 29 = -8y + 17$

$6y = -12$

$\boxed{y = -2}$

Exercise

Solve: $V = lwh,$ *for* h

Solution

$\boxed{h = \frac{V}{lw}}$

Exercise

Solve: $A = \frac{1}{2}h\left(B + b\right)$ *for* B

Solution

$2A = h(B + b)$ Multiply both sides by 2

$\frac{2A}{h} = B + b$ Divide both sides by h

$\boxed{B = \frac{2A}{h} - b}$

Exercise

Solve: $A = \frac{1}{2}h(a + b)$ for a

Solution

$2A = 2\frac{1}{2}h(a + b)$

$2A = h(a + b)$

$\frac{2A}{h} = \frac{h}{h}(a + b)$

$\frac{2A}{h} = a + b$

$\frac{2A}{h} - b = a$

$\boxed{a = \frac{2A}{h} - b}$ or $a = \frac{2A - bh}{h}$

Exercise

Solve: $S = 2\pi rh + 2\pi r^2$ *for* h

Solution

$2\pi rh = S - 2\pi r^2$

$\boxed{h = \frac{S - 2\pi r^2}{2\pi r}}$

Exercise

Solve: $A = \frac{1}{2}h\left(b_1 + b_2\right)$, *for* h

Solution

$2A = h\left(b_1 + b_2\right)$

$\boxed{h = \frac{2A}{b_1 + b_2}}$

Exercise

Solve: $A = \frac{1}{2}h\left(b_1 + b_2\right)$, *for* b_2

Solution

$$2A = h(b_1 + b_2)$$

$$\frac{2A}{h} = b_1 + b_2$$

$$\boxed{b_2 = \frac{2A}{h} - b_1}$$

Exercise

Solve: $A = \frac{1}{2}h\left(b_1 + b_2\right)$, *for* b_1

Solution

$$\frac{2A}{h} = b_1 + b_2$$

$$\boxed{b_1 = \frac{2A}{h} - b_2}$$

Exercise

Solve: $S = P + \mathrm{Pr}\,t$ *for t.*

Solution

$$S - P = \mathrm{Pr}\,t$$

$$\frac{S - P}{\mathrm{Pr}} = \frac{\mathrm{Pr}}{\mathrm{Pr}}t$$

$$\boxed{t = \frac{S - P}{\mathrm{Pr}}}$$

Exercise

Solve: $S = 2lw + 2wh + 2hl$ *for* h

Solution

$$S = 2lw + \left(2w + 2l\right)h$$

$$\left(2w + 2l\right)h = S - 2lw$$

$$\boxed{h = \frac{S - 2lw}{2w + 2l}}$$

Exercise

Solve: $S = 2lw + 2wh + 2hl$ *for* w

Solution

$$S = (2l + 2h)w + 2hl$$

$$(2l + 2h)w = S - 2hl$$

$$\boxed{w = \frac{S - 2hl}{2l + 2h}}$$

Exercise

Solve: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ *for* R_1

Solution

1st Method

Multiply by the common denominator RR_1R_2

$$RR_1R_2\ \frac{1}{R} = RR_1R_2\ \frac{1}{R_1} + RR_1R_2\ \frac{1}{R_2}$$ ***Simplify***

$$R_1R_2 = RR_2 + RR_1$$ ***Move R_1 to one side***

$$R_1R_2 - RR_1 = RR_2$$ ***Factor R_1***

$$R_1(R_2 - R) = RR_2$$ ***Divide by $R_2 - R$***

$$\boxed{R_1 = \frac{RR_2}{R_2 - R}}$$

2nd Method

$$\frac{1}{R} - \frac{1}{R_2} = \frac{1}{R_1}$$ ***Common denominator on one side of the equality***

$$\frac{R_2 - R}{RR_2} = \frac{1}{R_1}$$ ***Cross multiplication***

$$R_1R_2 - RR_1 = RR_2$$ ***Factor R_1***

$$R_1(R_2 - R) = RR_2$$ ***Divide by $R_2 - R$***

$$\boxed{R_1 = \frac{RR_2}{R_2 - R}}$$

3rd Method

$$\frac{1}{R} - \frac{1}{R_2} = \frac{1}{R_1}$$

$$\frac{R_2 - R}{RR_2} = \frac{1}{R_1}$$ ***Cross multiplication***

$$R_1 = \frac{RR_2}{R_2 - R}$$

Flip

Exercise

Solve: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ *for* R

Solution

$$\frac{1}{R} = \frac{R_1 + R_2}{R_1 R_2}$$

$$R = \frac{R_1 R_2}{R_1 + R_2}$$

Exercise

Solve: $V = \frac{d_1 - d_2}{t}$ *for* d_1

Solution

$$d_1 - d_2 = Vt$$

$$d_1 = Vt + d_2$$

Exercise

Solve: $V = \frac{d_1 - d_2}{t}$ *for* d_2

Solution

$$d_1 - d_2 = Vt$$

$$d_2 = d_1 - Vt$$

Exercise

Solve: $z = \frac{x - \mu}{s}$ *for* x

Solution

$$x - \mu = sz$$

$$x = sz + \mu$$

Exercise

Solve: $z = \frac{x-\mu}{s}$ *for* μ

Solution

$x - \mu = sz$

$\underline{\mu = x - sz}$

Exercise

Solve: $s = \frac{1}{2}at^2 + vt$ *for* v

Solution

$vt = s - \frac{1}{2}at^2$

$\underline{v = \frac{s}{t} - \frac{1}{2}at}$

Exercise

Solve: $s = \frac{1}{2}at^2 + vt$ *for* a

Solution

$\frac{1}{2}at^2 = s - vt$

$at^2 = 2s - 2vt$

$\underline{a = \frac{2s - 2vt}{t^2}}$

Exercise

Solve: $L = a + (n-1)d$ *for* n

Solution

$(n-1)d = L - a$

$n - 1 = \frac{L-a}{d}$

$\underline{n = \frac{L-a}{d} + 1}$

Exercise

Solve: $L = a + (n-1)d$ *for* d

Solution

$$(n-1)d = L - a$$

$$\boxed{d = \frac{L-a}{n-1}}$$

Exercise

Solve: $A = \frac{x_1 + x_2 + x_3}{n}$ *for* x_2

Solution

$$x_1 + x_2 + x_3 = nA$$

$$\boxed{x_2 = nA - x_1 - x_3}$$

Exercise

Solve: $A = \frac{x_1 + x_2 + x_3}{n}$ *for* n

Solution

$$\boxed{n = \frac{x_1 + x_2 + x_3}{A}}$$

Exercise

A sewage treatment plant has two inlet pipes to its settling pond. One can fill the pond in 10 *hrs*, the other in 12 *hrs*. If the first pipe is open for 5 *hrs* and then the second pipe us opened, how long will it take to fill the pond?

Solution

	Rate	***Time***	***Job:*** $A = rt$
One	$\frac{1}{10}$	x	$\frac{x}{10}$
Other	$\frac{1}{12}$	$x-5$	$\frac{x-5}{12}$

$$\frac{x}{10} + \frac{x-5}{12} = 1$$

$$(60)\frac{x}{10} + (60)\frac{x-5}{12} = 1(60)$$

$6x + 5(x - 5) = 60$

$6x + 5x - 25 = 60$

$11x = 85$

$\boxed{x = \frac{85}{11} \approx 7.72}$

The other $= \frac{85}{11} - 5$

$\boxed{= \frac{30}{11}}$