

EXERCISES FOR APPENDIX: LINEAR EQUATIONS AND INEQUALITIES

Question 1 In Exercises ?? - ??, solve the given linear equation and check your answer.

Problem 1.1 $3x - 4 = 2 - 4(x - 3)$

$$x = \frac{18}{7}$$

Problem 1.2 $\frac{3 - 2t}{4} = 7t + 1$

$$t = -\frac{1}{30}$$

Problem 1.3 $\frac{2(w - 3)}{5} = \frac{4}{15} - \frac{3w + 1}{9}$

$$w = \frac{61}{33}$$

Problem 1.4 $-0.02y + 1000 = 0$

$$y = 50000$$

Problem 1.5 $\frac{49w - 14}{7} = 3w - (2 - 4w)$

All real numbers.

Problem 1.6 $7 - (4 - x) = \frac{2x - 3}{2}$

No solution.

Problem 1.7 $3t\sqrt{7} + 5 = 0$

$$t = -\frac{5}{3\sqrt{7}} = -\frac{5\sqrt{7}}{21}$$

Problem 1.8 $\sqrt{50}y = \frac{6 - \sqrt{8}y}{3}$

$$y = \frac{6}{17\sqrt{2}} = \frac{3\sqrt{2}}{17}$$

Problem 1.9 $4 - (2x + 1) = \frac{x\sqrt{7}}{9}$

$$x = \frac{27}{18 + \sqrt{7}}$$

Question 2 In equations ?? - ??, solve each equation for the indicated variable.

Problem 2.1 Solve for y : $3x + 2y = 4$

$$y = \frac{4 - 3x}{2} \text{ or } y = -\frac{3}{2}x + 2$$

Problem 2.2 Solve for x : $3x + 2y = 4$

$$x = \frac{4 - 2y}{3} \text{ or } x = -\frac{2}{3}y + \frac{4}{3}$$

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Problem 2.3 Solve for C : $F = \frac{9}{5}C + 32$

$$C = \frac{5}{9}(F - 32) \text{ or } C = \frac{5}{9}F - \frac{160}{9}$$

Problem 2.4 Solve for x : $p = -2.5x + 15$

$$x = \frac{p - 15}{-2.5} = \frac{15 - p}{2.5} \text{ or } x = -\frac{2}{5}p + 6.$$

Problem 2.5 Solve for x : $C = 200x + 1000$

$$x = \frac{C - 1000}{200} \text{ or } x = \frac{1}{200}C - 5$$

Problem 2.6 Solve for y : $x = 4(y + 1) + 3$

$$y = \frac{x - 7}{4} \text{ or } y = \frac{1}{4}x - \frac{7}{4}$$

Problem 2.7 Solve for w : $vw - 1 = 3v$

$$w = \frac{3v + 1}{v}, \text{ provided } v \neq 0$$

Problem 2.8 Solve for v : $vw - 1 = 3v$

$$v = \frac{1}{w - 3}, \text{ provided } w \neq 3$$

Problem 2.9 Solve for y : $x(y - 3) = 2y + 1$

$$y = \frac{3x + 1}{x - 2}, \text{ provided } x \neq 2.$$

Problem 2.10 Solve for π : $C = 2\pi r$

$$\pi = \frac{C}{2r}, \text{ provided } r \neq 0.$$

Problem 2.11 Solve for V : $PV = nRT$

$$V = \frac{nRT}{P}, \text{ provided } P \neq 0.$$

Problem 2.12 Solve for R : $PV = nRT$

$$R = \frac{PV}{nT}, \text{ provided } n \neq 0, T \neq 0.$$

Problem 2.13 Solve for g : $E = mgh$

$$g = \frac{E}{mh}, \text{ provided } m \neq 0, h \neq 0.$$

Problem 2.14 Solve for m : $E = \frac{1}{2}mv^2$

$$m = \frac{2E}{v^2}, \text{ provided } v^2 \neq 0 \text{ (so } v \neq 0)$$

In Exercises ?? - ??, the subscripts on the variables have no intrinsic mathematical meaning; they're just used to distinguish one variable from another. In other words, treat ' P_1 ' and ' P_2 ' as two different variables as you would ' x ' and ' y .' (The same goes for ' x ' and ' x_0 ,' etc.)

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Problem 2.15 Solve for V_2 : $P_1 V_1 = P_2 V_2$

$$V_2 = \frac{P_1 V_1}{P_2}, \text{ provided } P_2 \neq 0.$$

Problem 2.16 Solve for t : $x = x_0 + at$

$$t = \frac{x - x_0}{a}, \text{ provided } a \neq 0.$$

Problem 2.17 Solve for x : $y - y_0 = m(x - x_0)$

$$x = \frac{y - y_0 + mx_0}{m} \text{ or } x = x_0 + \frac{y - y_0}{m}, \text{ provided } m \neq 0.$$

Problem 2.18 Solve for T_1 : $q = mc(T_2 - T_1)$

$$T_1 = \frac{mcT_2 - q}{mc} \text{ or } T_1 = T_2 - \frac{q}{mc}, \text{ provided } m \neq 0, c \neq 0.$$

Problem 3 With the help of your classmates, find values for c so that the equation: $2x - 5c = 1 - c(x + 2)$

1. has $x = 42$ as a solution.
2. has no solution (that is, the equation is a contradiction.)

Is it possible to find a value of c so the equation is an identity? Explain.

Question 4 In Exercises ?? - ??, solve the given inequality. Write your answer using interval notation.

Problem 4.1 $3 - 4x \geq 0$

$$\left(-\infty, \frac{3}{4}\right]$$

Problem 4.2 $2t - 1 < 3 - (4t - 3)$

$$\left(-\infty, \frac{7}{6}\right)$$

Problem 4.3 $\frac{7 - y}{4} \geq 3y + 1$

$$\left(-\infty, \frac{3}{13}\right]$$

Problem 4.4 $0.05R + 1.2 > 0.8 - 0.25R$

$$\left(-\frac{4}{3}, \infty\right)$$

Problem 4.5 $7 - (2 - x) \leq x + 3$

No solution.

Problem 4.6 $\frac{10m + 1}{5} \geq 2m - \frac{1}{2}$

$$(-\infty, \infty)$$

Problem 4.7 $x\sqrt{12} - \sqrt{3} > \sqrt{3}x + \sqrt{27}$

$$(4, \infty)$$

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Problem 4.8 $2t - 7 \leq \sqrt[3]{18}t$

$$\left[\frac{7}{2 - \sqrt[3]{18}}, \infty \right)$$

Problem 4.9 $117y \geq y\sqrt{2} - 7y\sqrt[4]{8}$

$$[0, \infty)$$

Problem 4.10 $-\frac{1}{2} \leq 5x - 3 \leq \frac{1}{2}$

$$\left[\frac{1}{2}, \frac{7}{10} \right]$$

Problem 4.11 $-\frac{3}{2} \leq \frac{4-2t}{10} < \frac{7}{6}$

$$\left(-\frac{23}{6}, \frac{19}{2} \right]$$

Problem 4.12 $-0.1 \leq \frac{5-x}{3} - 2 < 0.1$

$$\left(-\frac{13}{10}, -\frac{7}{10} \right]$$

Problem 4.13 $2y \leq 3 - y < 7$

$$(-4, 1]$$

Problem 4.14 $3x \geq 4 - x \geq 3$

$$\{1\} = [1, 1]$$

Problem 4.15 $6 - 5t > \frac{4t}{3} \geq t - 2$

$$\left[-6, \frac{18}{19} \right)$$

Problem 4.16 $2x + 1 \leq -1$ or $2x + 1 \geq 1$

$$(-\infty, -1] \cup [0, \infty)$$

Problem 4.17 $4 - x \leq 0$ or $2x + 7 < x$

$$(-\infty, -7) \cup [4, \infty)$$

Problem 4.18 $\frac{5-2x}{3} > x$ or $2x + 5 \geq 1$

$$(-\infty, \infty)$$