

Section 1.4 Things to Know:

- Solve two-step equations using inverse operations
 - Use addition / subtraction to isolate the term with the variable
 - Use multiplication / division to get the coefficient of the variable = 1
 - Simplify each side FIRST by combining like terms or distributing, and then solve
- Express word problems as two-step algebraic equations and solve them.

Solve each equation.

1. $18 + 4a = 10$

$$\begin{array}{r} 18 + 4a = 10 \\ -18 \quad -18 \\ \hline 4a = -8 \\ \boxed{a = -2} \end{array}$$

2. $5t - 2 = -32$

$$\begin{array}{r} 5t - 2 = -32 \\ +2 \quad +2 \\ \hline 5t = -30 \\ \boxed{t = 6} \end{array}$$

3. $\frac{y}{8} - \frac{3}{4} = \frac{5}{4}$

$$\begin{array}{r} \frac{y}{8} - \frac{3}{4} = \frac{5}{4} \\ +\frac{3}{4} \quad +\frac{3}{4} \\ \hline \frac{y}{8} = 2 \cdot 8 \end{array}$$

4. $\frac{2}{3}r - \frac{3}{4} = \frac{7}{12}$

$$\begin{array}{r} \frac{2}{3}r - \frac{3}{4} = \frac{7}{12} \\ +\frac{3}{4} \quad +\frac{3}{4} \\ \hline \frac{2}{3}r = \frac{4}{3} \end{array}$$

$\frac{7}{12} + \frac{9}{12} = \frac{16}{12} \rightarrow \frac{4}{3}$

8. $\frac{y}{8} = 2 \cdot 8$

$$\boxed{y = 16}$$

$\frac{3}{2} \cdot \frac{2}{3}r = \frac{4}{3} \cdot \frac{3}{2}$

$$\boxed{r = 2}$$

5. $4. 8x - 21 - 5x = -15$

$$\begin{array}{r} 8x - 21 = -15 \\ +21 \quad +21 \\ \hline 3x = 6 \\ \frac{3x}{3} = \frac{6}{3} \\ \boxed{x = 2} \end{array}$$

6. $10y - (4y + 8) = -20$

$$\begin{array}{r} 10y - 4y - 8 = -20 \\ 6y - 8 = -20 \\ +8 \quad +8 \\ \hline 6y = -12 \\ \frac{6y}{6} = \frac{-12}{6} \\ \boxed{y = -2} \end{array}$$

7. Jan joined the dining club at the local café for a fee of \$29.95. Being a member entitles her to save \$2.50 every time she buys lunch. So far, Jan has saved a total of \$12.55 by joining the club.

a. Write an equation to find out how many times Jan has eaten at the café.

$$\begin{array}{r} 29.95 - 2.50x = 12.50 \\ -29.95 \quad -29.95 \\ \hline -2.50x = -17.40 \end{array}$$

b. Solve to find out how many times Jan has eaten at the café.

$$-2.50x = -17.40$$

$$x = 7$$

$$\boxed{7 \text{ times}}$$

Section 1.5 Things to Know

- Solve equations in one variable that contain variable terms on both sides of the equation.
 - Bring variables on one side
 - Bring constants to the other side
 - Solve
- Express word problems as algebraic equations that contain variables on both sides of the equation and solve them.

8. $7k = 4k + 15$

$$\begin{array}{r} 7k = 4k + 15 \\ -4k \quad -4k \\ \hline 3k = 15 \\ \frac{3k}{3} = \frac{15}{3} \\ \boxed{k = 5} \end{array}$$

9. $x + 2 = 3x$

$$\begin{array}{r} x + 2 = 3x \\ -4x \quad -4x \\ \hline 2 = -x \\ \frac{2}{-1} = \frac{-x}{-1} \\ \boxed{-2 = x} \end{array}$$

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

$$-5x + 4 = -5x + 4$$

$\boxed{\text{all real \#s}}$

11. $-8y + 6 + 9y = -17 + y$

$$\begin{array}{r} y + 6 = y - 17 \\ -y \quad -y \\ \hline 6 = -17 \end{array}$$

$6 = -17$

$\boxed{\text{no solution}}$

12. $2(y + 6) = 3y$

$$\begin{array}{r} 2y + 12 = 3y \\ -2y \quad -2y \\ \hline 12 = y \end{array}$$

13. $2k - 5 = 3(1 - 2k)$

$$\begin{array}{r} 2k - 5 = 3 - 6k \\ +6k \quad +6k \\ \hline 8k - 5 = 3 \\ \frac{8k}{8} - \frac{5}{8} = \frac{3}{8} \\ \frac{8k}{8} = \frac{4}{8} \end{array}$$

$\frac{8k}{8} = \frac{4}{8}$

$\boxed{k = 1/2}$

14. $3 - 5b + 2b = -2 - 2(1 - b)$

$$\begin{array}{r} -3b + 3 = -2 - 2 + 2b \\ -3b + 3 = -4 + 2b \\ +3b \quad +3b \\ \hline 3 = -4 + 5b \\ +4 \quad +4 \\ \hline 7 = 5b \end{array}$$

$\frac{3}{5} = \frac{-4 + 5b}{5}$
 $\frac{7}{5} = 5b$
 $\boxed{b = 7/5}$

15. $3x + 15 - 9 = 2(x + 2)$

$$\begin{array}{r} 3x + 6 = 2x + 4 \\ -2x \quad -2x \\ \hline x + 6 = 4 \end{array}$$

$$\begin{array}{r} x + 6 = 4 \\ -6 \quad -6 \\ \hline x = -2 \end{array}$$

$\boxed{x = -2}$

16. A moving company charges \$800 plus \$16 per hour. Another moving company charges \$720 plus \$21 per hour. How long is a job that costs the same no matter which company is used?

a. Write an equation to express this problem:

$$\begin{array}{r} 800 + 16h = 720 + 21h \\ -16h \qquad \qquad -16h \\ \hline \end{array}$$

b. Solve to find out how long the job is.

$$\begin{array}{r} 800 = 720 + 5h \\ -720 \quad -720 \\ \hline \end{array}$$

$h = 16$

16 hours

$80/5 = 5h/5$

17. The long-distance rates of two phone companies are shown in the table. How long is a call that costs the same amount no matter which company is used?

a. Write an equation to express this problem.

$$\begin{array}{r} .36 + .03x = .06x \\ - .03x \quad - .03x \\ \hline \end{array}$$

Phone Company	Charges
Company A	\$0.36 plus \$0.03 per minute
Company B	\$0.06 per minute

b. Solve to find out what the cost of that call is.

$$\begin{array}{r} .36 = .03x \\ .03 \quad .03 \\ \hline \end{array}$$

$x = 12$

12 min

13. Solve $0.4x - 0.2 = 1$

A 0.2

C 2

B 0.3

D 3

$$\begin{array}{r} 0.4x = 1.2 \\ .4 \quad .4 \\ \hline \end{array}$$

$x = 3$

14. A bike rental company charges a \$4.00 rental fee plus \$2.00 per hour. Selena paid \$12.00 to rent a bike. How long did Selena rent the bike for?

F 2 h

H 6 h

G 4 h

J 8 h

$$4 + 2x = 12$$

$$2x = 8$$

$$x = 4$$

15. Solve $3x - 7 = 5x + 3$.

A -5

C $-\frac{5}{4}$

B -2

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

$$\begin{array}{r} 3x - 7 = 5x + 3 \\ -3x \quad -3x \\ \hline -7 = 2x + 3 \\ -3 \quad -3 \\ \hline -10 = 2x \\ \frac{-10}{2} = \frac{2x}{2} \end{array}$$

$$-5 = x$$

16. Solve $7b + 3 - 4b = 3 - 3(b + 4)$.

F no solution H $\frac{2}{3}$

G -2

J all real numbers

$$\begin{array}{l} \rightarrow 3b + 3 = 3 - 3b - 12 \\ 3b + 3 = -3b - 9 \\ +3b \quad -3 \quad +3b \quad -3 \\ \hline 6b = -13 \\ \frac{6b}{6} = \frac{-13}{6} \\ b = -\frac{13}{6} \end{array}$$

17. Which of the following equations has NO solution?

A $d + 2 = d + 2$
 $2 = 2$

B $a = -a + 2$
 $+a \quad +a$
 $2a = 2$
 $a = 1$

C $a + 2 = a - 2$

$2 = -2$
false!

D $a + a = 2$
 $2a = 2$
 $a = 1$

$b = -2$

18. A cable company charges \$75 for installation plus \$20 per month. Another cable company offers free installation but charges \$35 per month. For how many months of cable service would the total cost from either company be the same?

F 2

H 5

G 3

J 7

$$75 + 20x = 35x$$

$$75 = 15x$$

$$7 = x$$