

8.5 Solving Equations with Variables on Each Side: Word Problems

Example: A personal trainer charges a one-time fee to \$60 plus \$25 for each individual session. A fitness club charges a yearly fee of \$450 plus \$10 for each session with a personal trainer. Write and solve an equation to determine for what number of sessions the costs will be equal.

Let m be the number of sessions.

$$60 + 25m = 450 + 10m$$

$$\quad \quad -10m \quad \quad -10m$$

$$60 + 15m = 450$$

$$\quad -60 \quad \quad -60$$

$$\frac{15m}{15} = \frac{390}{15}$$

$$m = 26 \text{ sessions}$$

$$\begin{array}{r} 26 \\ 15 \overline{) 390} \\ \underline{-300} \\ 90 \\ \underline{-90} \\ 0 \end{array}$$

Example: A car rental agency has two plans. Under Plan A, a car rents for \$80 plus \$20 each day. Under Plan B, a car rents for \$120 plus \$15 each day. Write and solve an equation to determine for what number of days the costs of the two plans will be equal.

Let a be the number of days.

$$80 + 20a = 120 + 15a$$

$$\quad \quad -15a \quad \quad -15a$$

$$80 + 5a = 120$$

$$\quad -80 \quad \quad -80$$

$$\frac{5a}{5} = \frac{40}{5}$$

$$a = 8 \text{ days}$$

Example: Red Bird Cruises charges \$85 per day plus a one-time fee of \$75. King Cruises charges \$100 per day plus a fee of \$30. Write and solve an equation to determine for what number of days the charge for the cruises will be the same.

Let C be the number of days.

$$\begin{array}{r} 85c + 75 = 100c + 30 \\ -85c \quad -85c \end{array}$$

$$\begin{array}{r} 75 = 15c + 30 \\ -30 \quad -30 \end{array}$$

$$\begin{array}{r} 45 = 15c \\ \underline{15} \quad \underline{15} \end{array}$$

$$\boxed{C = 3 \text{ days}}$$

Example: An Internet movie rental company charges a yearly membership fee of \$50 plus \$1.99 per DVD rental. Your neighborhood rental store has no membership fee and charges \$3.99 per DVD rental. Write and solve an equation to find the number of DVDs for which the cost of each will be the same.

Let q be the number of DVDs.

$$\begin{array}{r} 50 + 1.99q = 3.99q \\ -1.99q \quad -1.99q \end{array}$$

$$\begin{array}{r} 50 = 2q \\ \underline{2} \quad \underline{2} \end{array}$$

$$\boxed{q = 25 \text{ DVDs}}$$