

Looking Ahead

Now that you have reviewed solving linear equation of the form $ax + b = cx + d$, you will be able to apply your skills to solving multi-step problems involving multiple equations like the following example.

Example Preview

Express the following equations in slope-intercept form and determine if the two lines are perpendicular.

$$8 - (3y + 4x) = 6(x - y) \quad \text{and} \quad 3y + 2 = 8 + 10x$$

Solution

$$\begin{array}{ll} 8 - (3y + 4x) = 6(x - y) & 3y + 2 = 8 + 10x \\ 8 - 3y - 4x = 6x - 6y & 3y = 10x + 8 - 2 \\ -3y + 6y = 6x + 4x - 8 & 3y = 10x + 6 \\ 3y = 10x - 8 & y = \frac{10}{3}x + 2 \\ y = \frac{10}{3}x - \frac{8}{3} & \end{array}$$

These two lines have slopes of $\frac{10}{3}$ and $\frac{10}{3}$, respectively. Since both of these lines have the same slope, these two lines are parallel and not perpendicular.

2.R.7 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- Every linear equation has exactly one solution.
- If a linear equation simplifies to a statement that is always true, then the original equation is called an identity.
- If an equation has no solution, it is called an identity.
- The most general form of a linear equation is $ax + b = cx + d$.

PracticeSolve each equation.

5. $3x + 2 = x - 8$

6. $2(z + 1) = 3z + 3$

7. $x - 0.1x + 0.8 = 0.2x + 0.1$

8. $0.6x - 22.9 = 1.5x - 18.4$

Determine whether each equation is a conditional equation, an identity, or a contradiction.

9. $-2x + 13 = -2(x - 7)$

10. $3x + 9 = -3(x - 3) + 6x$

Applications

Solve.

- 11. Event Planning:** Caitlyn and Steve are planning their wedding reception and must decide between two catering halls. The first site, A Wedding Space, rents for \$800 for one day and charges \$50 per person for dinner. The second venue, A Wedding Place, costs \$1000 to rent for one day and charges \$40 per person for the same dinner. Solve the equation $800 + 50x = 1000 + 40x$ to determine how many guests they can invite so that the cost they pay will be the same at both wedding catering halls.
- 12. Personal Finance:** The value of a new car depreciates at a rate of about \$250 per month. Suppose a car originally costs \$30,000. The car was bought with a \$1000 down payment and a loan with 0% financing for 60 months with payments of \$200 a month. Solve the equation $30,000 - 250t = 29,000 - 200t$ to determine how many months it will take for the value of the vehicle to equal the amount owed on the loan?

Writing & Thinking

- 13.** Answer each question.
- Simplify the expression $3(x + 5) + 2(x - 7)$.
 - Solve the equation $3(x + 5) + 2(x - 7) = 31$.
 - How are the methods you used to answer questions **a.** and **b.** similar? How are they different?