When you have a system of equations to solve, how do you know which method to use? Today you will focus on how to choose a strategy that is the most convenient and efficient for solving a system of equations.

\[
\begin{align*}
2x + 3y &= 5 \\
5x + 2y &= 10
\end{align*}
\]

\[
\text{mult by } -2 \\
-11x - 6y &= -10
\]

\[
\begin{align*}
15x + 6y &= 30 \\
11x &= 240
\end{align*}
\]

\[
\frac{240}{11} = x
\]
6-112. Erica works in a soda-bottling factory. As bottles pass her on a conveyor belt, she puts caps on them. Unfortunately, Erica sometimes breaks a bottle before she can cap it. She gets paid 4¢ for each bottle she successfully caps, but her boss deducts 2¢ from her pay for each bottle she breaks.

Erica is having a bad morning. Fifteen bottles have come her way, but she has been breaking some and has only earned 6¢ so far today. How many bottles has Erica capped and how many has she broken?

a. Write a system of equations representing this situation.

b. Solve the system of equations using two different methods: substitution and elimination. Demonstrate that each method results in the same solution.

\[
\begin{align*}
\text{Let } c &= \text{ the \# of bottles Erica caps} \\
\text{Let } b &= \text{ the \# of bottles Erica breaks} \\
\text{Money} &\rightarrow 4c - 2b = 6 \\
\text{\# of bottles} &\rightarrow c + b = 15
\end{align*}
\]
\[4c - 2b = 6\]
\[c + b = 15\]
\[
\begin{align*}
\text{by 2} \\
\text{multiply}
\end{align*}
\]
\[2c + 2b = 30\]

\[6c + 0 = 36\]
\[6c = 36\]
\[c = 6\]
6.1.4 - Choosing a Strategy for Solving a System

- **Money:**
  \[ c + b = 15 \]
  \[ c = 15 - b \]
- **Bottles:**
  \[ 60 - 4b = 4 \]

**Steps:**
1. \[ 4(15-b) - 2b = 6 \]
2. \[ 60 - 4b - 2b = 6 \]
3. \[ 60 - 6b = 6 \]
4. \[ -6b = -54 \]
5. \[ b = 9 \]

**Solution:**
- \[ c + b = 15 \]
- \[ c + 9 = 15 \]
- \[ c = 6 \]
4c + 2(15 - c) = 6
4c - 30 + 2c = 6
6c - 30 + 30 = 6
6c = 36

\[
\begin{array}{c}
\frac{c + b = 15}{-c - c} \\
\cdot \quad b = 15 - c
\end{array}
\]
6-113. For each system below, decide which algebraic solving strategy to use. That is, which method would be the most efficient and convenient: the Substitution Method, the Elimination Method, or setting the equations equal to each other (the Equal Values method)? Do not solve the systems yet! Be prepared to justify your reasons for choosing one strategy over the others.

a. \[ x = 4 - 2y \]
   \[ 3x - 2y = 4 \]

b. \[ 3x + y = 1 \]
   \[ 4x + y = 2 \]

c. \[ x = -5y + 2 \]
   \[ x = 3y - 2 \]

d. \[ 2x - 4y = 10 \]
   \[ 2y + 6 = x \]

e. \[ d = 2(7 + w) \]
   \[ 3d = 15(7 - w) \]

f. \[ -6x + 2y = 76 \]
   \[ 3x - y = -38 \]

g. \[ 5x + 3y = -6 \]
   \[ 2x - 9y = 18 \]

h. \[ x - 3 = y \]
   \[ 2(x - 3) - y = 7 \]
6-114. With your team, use the best strategy to solve each system in problem 6-113. Be sure to check your solution.