Solving Systems by Substitution

Algebra 1 •Section 6.2

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

A system asks for values that satisfy every relationship at the same time. The solution may be one point, no point, or infinitely many points, depending on how the graphs or equations meet.

▷ **Example:** Solve $y = x + 4$ and $y = 10$.
Work: Substitute 10 for y: $10 = x + 4$, so $x = 6$. The solution is the point where both equations agree.

★ **Answer:** $(6, 10)$

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Solve: $y = x + 3$, $y = 9$.

2. Solve: $y = 2x - 1$, $x + y = 14$.

3. Solve: $x = 3y$, $x + y = 16$.

4. Solve: $y = -x + 7$, $2x + y = 11$.

5. Solve: $x = y + 5$, $x - y = 5$.

6. Solve: $y = 4x$, $y = 20$.

7. Solve: $a = b - 2$, $a + b = 10$.

8. Solve: $y = x^2$, $y = 16$.

9. Solve: $y = 3x + 2$, $y = x + 10$.

10. Solve: $x = 2$, $y = x + 6$.

Word Problems

11. Adult tickets cost $\$8$ and student tickets $\$5$. If $a = s + 6$ and revenue is $\$154$, find a and s.

12. Two numbers have sum 31. The larger is 5 more than the smaller. Find them.

Answer Keys

1. $(6, 9)$
2. $(5, 9)$
3. $(12, 4)$
4. $(4, 3)$
5. Infinitely many solutions
6. $(5, 20)$
7. $(4, 6)$
8. $(-4, 16)$ and $(4, 16)$
9. $(4, 14)$
10. $(2, 8)$
11. $a = 18$, $s = 12$
12. 13 and 18

Step-by-Step Explanations

1. Since y is already 9, swap it into the other equation: $9 = x + 3$ leaves $x = 6$.
2. One equation hands you y, so drop $2x - 1$ in for y: $3x - 1 = 14$ gives $x = 5$.
3. Replace x with $3y$ everywhere; the second equation collapses to $4y = 16$, so $y = 4$.
4. Trade y for $-x + 7$ and watch it simplify to $x + 7 = 11$, pinning $x = 4$ and then $y = 3$.
5. Rearrange the first and it literally says $x - y = 5$ — the same line twice, so every point works.
6. Both name y, so $4x = 20$; one quick divide and $x = 5$.
7. Substitute $b - 2$ for a: the sum becomes $2b - 2 = 10$, so $b = 6$ and a follows as 4.
8. Setting $x^2 = 16$ — and don't forget, two numbers square to 16, both -4 and 4.
9. They share a y, so glue them: $3x + 2 = x + 10$ tidies to $2x = 8$.
10. You already know $x = 2$ — just carry it into $y = x + 6$ and the height is 8.
11. Trade a for $s + 6$ in the money equation; $8(s + 6) + 5s = 154$ untangles to give $s = 12$.
12. Call the small one s, so the big one is $s + 5$; their sum $2s + 5 = 31$ pins $s = 13$.

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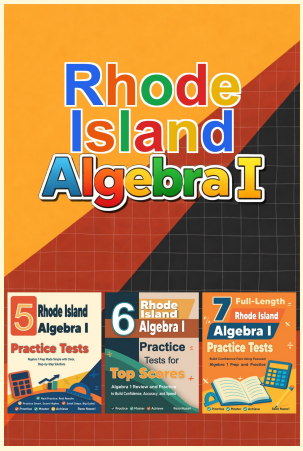

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