Applications of Systems of Equations

Algebra 1 •Section 6.4

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. Set up: 2 apples and 3 bananas cost 11; 4 apples and 1 banana cost 13.

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2. Solve $a + b = 14$, $2a + b = 22$.

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3. Two numbers sum to 28 and differ by 6. Find them.

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4. Tickets: $s + a = 120$, $5s + 9a = 820$. Find s and a.

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5. Coins: nickels and dimes total 18 coins and $\$1.35$. Find each.

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6. Mixture: $x + y = 10$, $2x + 5y = 38$. Find x, y.

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7. Rental: Plan A $30 + 8h$, Plan B $12 + 12h$. When equal?

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8. Speed: one car travels $60t$, another $45t + 90$. When equal?

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9. Find intersection of cost equations $C = 20 + 3x$ and $C = 8 + 5x$.

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10. Write a system for two numbers: sum 40, one is 8 more than the other.

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Word Problems

11. A farm has chickens and cows: 30 animals and 86 legs. Find each.

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12. Two classes sell 96 tickets total. Class A sells 14 more than Class B. Find each.

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Answer Keys

1. $2a + 3b = 11, 4a + b = 13$
2. $a = 8, b = 6$
3. 17 and 11
4. $s = 65, a = 55$
5. 9 nickels, 9 dimes
6. $x = 4, y = 6$
7. $h = 4.5$
8. $t = 6$
9. $(6, 38)$
10. $x + y = 40, x = y + 8$
11. 17 chickens, 13 cows
12. 55 and 41

Step-by-Step Explanations

1. Each shopping trip becomes an equation — count times price for every fruit, summed to the total spent.
2. Both share a $+b$, so subtracting the equations isolates $a = 8$, and then b must be 6.
3. Write $x + y = 28$ and $x - y = 6$, then add — the y's cancel and $2x = 34$.
4. Solve the count equation for $s = 120 - a$, then slot it into the revenue equation to find a.
5. One equation counts the coins, $n + d = 18$; the other counts the cents, $5n + 10d = 135$.
6. Rewrite the first as $x = 10 - y$ and carry it into the second to solve for y alone.
7. The plans tie when their costs match: $30+8h = 12+12h$ shrinks to $18 = 4h$.
8. Set the distances equal — $60t = 45t + 90$ — and the gap $15t = 90$ tells you when they're side by side.
9. At the crossing both costs are the same, so $20 + 3x = 8 + 5x$ gives $x = 6$, and C rings up to 38.
10. Turn each sentence into math — one line captures the total, the other captures how they compare.
11. Count heads with $c + w = 30$ and legs with $2c + 4w = 86$; substituting sorts out $w = 13$.
12. With $A + B = 96$ and $A = B + 14$, swap in for A: $2B + 14 = 96$ pins down Class B.

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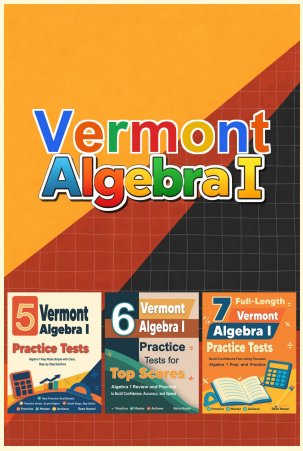

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