

Solving Systems by Substitution

Name: _____

Date: _____

Score: _____ / 24

Q Quick Review

Substitution method: when one equation is already solved (or easily solvable) for one variable, substitute that expression into the other equation. Steps: **(1)** solve one equation for one variable; **(2)** substitute into the other equation to get a one-variable equation; **(3)** solve; **(4)** substitute back to find the other variable. Substitution is best when a variable has a coefficient of ± 1 — isolating it is easy. **Special outcomes:** if the variables cancel and you get a *true* statement, infinitely many solutions; if you get a *false* statement, no solution.

PRACTICE

Solve each system by substitution.

1. $y = x + 3, 2x + y = 12$ _____

2. $y = -x, 3x + 2y = 4$ _____

3. $x = 2y, x + 3y = 10$ _____

4. $y = 2x - 1, x + y = 8$ _____

5. $y = 3, 2x - y = 5$ _____

6. $y = x + 5, y = 2x + 3$ _____

7. $x = y + 1, 2x - 3y = 0$ _____

8. $y = 4x, 5x - y = 3$ _____

9. $y = -2x + 6, 4x + y = 8$ _____

10. $x + y = 10, x - y = 4$ _____

11. $y = x, y = -x + 8$ _____

12. $y = 2x, y = 2x + 5$ _____

13. $y = x + 1, 3y = 3x + 3$ _____

14. $x = 3y + 2, 2x - 6y = 4$ _____

15. $y = 5, x = 2y - 1$ _____

16. $x = 4, 3x + 2y = 20$ _____

17. $y = \frac{1}{2}x, 4x - y = 14$ _____

18. $x + 2y = 7, x = y + 1$ _____

19. $y = 3x - 2, y = -x + 6$ _____

20. $y = -x + 1, 2x + y = -3$ _____

◆ Word Problems

21. Two numbers sum to 20 and one is 3 times the other. Find them.

22. At a fair, adult tickets cost \$8 and child tickets \$5. Total tickets sold: 25. Total revenue: \$170. How many adult tickets?

23. A rectangle's length is 3 more than its width. Its perimeter is 26 cm. Find dimensions.

24. A coin jar has \$3.10 in nickels and dimes. Total coins: 40. How many nickels?



Scan Me

Answer Keys

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. (3, 6) 2. (4, -4) 3. (4, 2) 4. (3, 5) 5. (4, 3) 6. (2, 7) 7. (3, 2) 8. (3, 12) 9. (1, 4) 10. (7, 3) 11. (4, 4) 12. no solution | <ol style="list-style-type: none"> 13. infinitely many 14. infinitely many 15. (9, 5) 16. (4, 4) 17. (4, 2) 18. (3, 2) 19. (2, 4) 20. (-4, 5) 21. 5 and 15 22. 15 23. $w = 5, \ell = 8$ 24. 18 |
|--|---|

Step-by-Step Tutor Notes

1. For a table question, slow down and locate the exact row, column, or cell before calculating. $2x + (x + 3) = 12 \Rightarrow 3x = 9 \Rightarrow x = 3, y = 6$. This gives (3, 6).
2. For a table question, slow down and locate the exact row, column, or cell before calculating. $3x + 2(-x) = 4 \Rightarrow x = 4, y = -4$. This gives (4, -4).
3. For a table question, slow down and locate the exact row, column, or cell before calculating. $2y + 3y = 10 \Rightarrow 5y = 10 \Rightarrow y = 2, x = 4$. This gives (4, 2).
4. For a table question, slow down and locate the exact row, column, or cell before calculating. $x + (2x - 1) = 8 \Rightarrow 3x = 9 \Rightarrow x = 3, y = 5$. This gives (3, 5).
5. Use the labels on the display first; they tell you which count or total belongs in the answer. $2x - 3 = 5 \Rightarrow x = 4$. This gives (4, 3).
6. Use the labels on the display first; they tell you which count or total belongs in the answer. $x + 5 = 2x + 3 \Rightarrow x = 2, y = 7$. This gives (2, 7).
7. Use the labels on the display first; they tell you which count or total belongs in the answer. $2(y + 1) - 3y = 0 \Rightarrow -y + 2 = 0 \Rightarrow y = 2, x = 3$. This gives (3, 2).
8. Use the labels on the display first; they tell you which count or total belongs in the answer. $5x - 4x = 3 \Rightarrow x = 3, y = 12$. This gives (3, 12).
9. Read the table by matching the correct row and column first, then use the count or total that fits the question. $4x + (-2x + 6) = 8 \Rightarrow 2x = 2 \Rightarrow x = 1, y = 4$. This gives (1, 4).
10. For a table question, slow down and locate the exact row, column, or cell before calculating. First gives $x = 10 - y$. Sub: $10 - y - y = 4 \Rightarrow y = 3, x = 7$. This gives (7, 3).
11. Read the table by matching the correct row and column first, then use the count or total that fits the question. $x = -x + 8 \Rightarrow x = 4, y = 4$. This gives (4, 4).
12. For a table question, slow down and locate the exact row, column, or cell before calculating. $2x = 2x + 5 \Rightarrow 0 = 5$. False — no solution. This gives no solution.
13. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Divide second by 3: $y = x + 1$. Same line. After simplifying, the answer is infinitely many.
14. Use the labels on the display first; they tell you which count or total belongs in the answer. Sub: $2(3y + 2) - 6y = 4 \Rightarrow 4 = 4$. True for any y . This gives infinitely many.
15. Take it one clear step at a time and keep the original question in mind. $x = 2(5) - 1 = 9$. So the answer is (9, 5).
16. Read the table by matching the correct row and column first, then use the count or total that fits the question. $12 + 2y = 20 \Rightarrow y = 4$. This gives (4, 4).
17. For a table question, slow down and locate the exact row, column, or cell before calculating. $4x - \frac{1}{2}x = 14 \Rightarrow \frac{7}{2}x = 14 \Rightarrow x = 4, y = 2$. This gives (4, 2).
18. For a table question, slow down and locate the exact row, column, or cell before calculating. $(y + 1) + 2y = 7 \Rightarrow 3y = 6 \Rightarrow y = 2, x = 3$. This gives (3, 2).
19. Read the table by matching the correct row and column first, then use the count or total that fits the question. $3x - 2 = -x + 6 \Rightarrow 4x = 8 \Rightarrow x = 2, y = 4$. This gives (2, 4).
20. For a table question, slow down and locate the exact row, column, or cell before calculating. $2x + (-x + 1) = -3 \Rightarrow x = -4, y = 5$. This gives (-4, 5).
21. Read the table by matching the correct row and column first, then use the count or total that fits the question. Let $x + y = 20$ and $y = 3x$. Sub: $x + 3x = 20 \Rightarrow x = 5, y = 15$. This gives 5 and 15.
22. $a + c = 25, 8a + 5c = 170$. From first: $c = 25 - a$. Sub: $8a + 5(25 - a) = 170 \Rightarrow 3a = 45 \Rightarrow a = 15$.
23. Use the labels on the display first; they tell you which count or total belongs in the answer. $\ell = w + 3$. Perimeter: $2(\ell + w) = 26 \Rightarrow \ell + w = 13 \Rightarrow (w + 3) + w = 13 \Rightarrow w = 5, \ell = 8$. This gives $w = 5, \ell = 8$.
24. $n + d = 40, 0.05n + 0.10d = 3.10$. From first: $d = 40 - n$. Sub: $0.05n + 0.10(40 - n) = 3.10 \Rightarrow -0.05n = -0.90 \Rightarrow n = 18$.



Scan Me

Want a Full Algebra 1 Textbook? Try Our Massachusetts MCAS Made Simple Book!



Massachusetts MCAS Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook
Plain-English explanations, guided practice, and review support.



Scan Me

Full Lessons Inside

Concepts
Practice
Mastery

Important: All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for MCAS test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

Start your practice journey!

6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

Take your practice to the next level!

7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

Go all the way with comprehensive practice!

☐ STUDENT FAVORITE • Master Algebra I From the Ground Up ☐



Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra Journey Today! →

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

↓ PDF EDITION



Scan Me

Instant download • any device

☐ PAPERBACK



Scan Me

Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

EffortlessMath.com/product/algebra-i-for-beginners