

Boost Free Lessons - Year 10 Maths

Lesson 6: Simultaneous Equations: Substitution

Name: _____ Grade: _____ Date: _____

Worked Example 1

Solve $y = 2x + 1$ and $3x + y = 11$

1. One equation already has y on its own, so substitute that expression into the other equation.
2. $3x + (2x + 1) = 11$.
3. Collect like terms: $5x + 1 = 11$, so $5x = 10$ and $x = 2$.
4. Substitute back into $y = 2x + 1$: $y = 2(2) + 1 = 5$.

$x = 2, y = 5$

Worked Example 2

Solve $y = x - 3$ and $2x + y = 9$

1. Substitute $y = x - 3$ into the second equation: $2x + (x - 3) = 9$.
2. Collect like terms: $3x - 3 = 9$, so $3x = 12$ and $x = 4$.
3. Substitute back: $y = 4 - 3 = 1$.
4. Check in **both** equations: $1 = 4 - 3$ (correct) and $2(4) + 1 = 9$ (correct).

$x = 4, y = 1$

Remember: Substitution works best when one variable is already on its own. Always substitute back to find the second variable, then check your answer in **both** original equations.



Question 1: Solve each pair of simultaneous equations.

1. $y = x + 2$ and $x + y = 8$

2. $y = 3x$ and $x + y = 16$

3. $y = 2x - 1$ and $x + y = 14$

4. $y = x + 5$ and $2x + y = 20$

5. $y = 4 - x$ and $3x + y = 12$

6. $x = y + 1$ and $2x + 3y = 17$

7. $y = 2x$ and $5x - y = 18$

8. $y = x - 4$ and $3x + 2y = 22$



Question 2: Solve each pair of simultaneous equations.

1. $x + y = 10$ and $y = 2x + 1$

2. $2x - y = 3$ and $y = x - 1$

3. $x + 2y = 11$ and $x = y + 2$

4. $3x + y = 14$ and $y = 4 - x$

5. $4x - y = 7$ and $y = 2x - 1$

6. $x + 3y = 14$ and $x = 2y - 1$





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Answers: Simultaneous Equations: Substitution**Question 1**

1. $x = 3, y = 5$
2. $x = 4, y = 12$
3. $x = 5, y = 9$
4. $x = 5, y = 10$
5. $x = 4, y = 0$
6. $x = 4, y = 3$
7. $x = 6, y = 12$
8. $x = 6, y = 2$

Question 2

1. $x = 3, y = 7$
2. $x = 2, y = 1$
3. $x = 5, y = 3$
4. $x = 5, y = -1$
5. $x = 3, y = 5$
6. $x = 5, y = 3$

Question 3

1. 8 and 12
2. 20 adult and 20 child tickets
3. $x = 3, y = 2$
4. Width 5 cm and length 10 cm
5. $x = 18, y = 6$

