

Boost Free Lessons - Year 9 Maths

Lesson 2: Variables on Both Sides

Name: _____ Grade: _____ Date: _____

Worked Example 1

Solve $5x - 3 = 2x + 12$

1. Collect the variable on one side. Subtract the **smaller** variable term, $2x$, from both sides.
2. That gives $3x - 3 = 12$.
3. Add 3 to both sides: $3x = 15$.
4. Divide both sides by 3, then check: $5(5) - 3 = 22$ and $2(5) + 12 = 22$ (correct).

$x = 5$

Worked Example 2

Solve $8 - a = 3a + 4$

1. The variable terms are $-a$ and $3a$. Adding a to both sides keeps the coefficient positive.
2. That gives $8 = 4a + 4$.
3. Subtract 4 from both sides: $4 = 4a$.
4. Divide both sides by 4.

$a = 1$

Remember: Collect the variable terms on one side and the numbers on the other. Move the **smaller** variable term so the coefficient stays positive.



Question 1: Solve the following equations.

1. $4x = 2x + 10$

2. $7y - 5 = 3y + 11$

3. $6a + 1 = 4a + 9$

4. $9k - 2 = 5k + 14$

5. $3n + 8 = n + 2$

6. $8p - 7 = 3p + 13$

7. $2t + 15 = 5t$

8. $10c - 4 = 6c + 12$

9. $5w + 9 = 2w - 3$

10. $12d - 8 = 7d + 22$



Question 2: Solve the following equations.

1. $3x + 7 = 5x - 3$

2. $2y - 9 = 5y + 6$

3. $8 - a = 3a + 4$

4. $6k + 2 = 2k - 10$

5. $5 - 2t = t - 7$

6. $9p + 4 = 4p + 4$

7. $7 - 3w = 2 - w$

8. $4c - 11 = 9c + 4$



Question 3: Answer the following questions.

1. Plan A costs \$30 plus \$2 per gigabyte. Plan B costs \$10 plus \$4 per gigabyte. Write an equation and find how many gigabytes make the two plans cost the same.
2. Twice a number plus 8 equals three times the number minus 5. Write an equation and find the number.
3. Gym A charges a \$50 joining fee plus \$30 per week. Gym B charges \$20 plus \$35 per week. After how many weeks is the total cost equal?
4. A rectangle with length $3x$ and width 4 has the same perimeter as a square of side $(x + 6)$. Write an equation and find x .
5. Explain why it is usually easier to move the smaller variable term rather than the larger one.





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Answers: Variables on Both Sides**Question 1**

1. $x = 5$

2. $y = 4$

3. $a = 4$

4. $k = 4$

5. $n = -3$

6. $p = 4$

7. $t = 5$

8. $c = 4$

9. $w = -4$

10. $d = 6$

Question 2

1. $x = 5$

2. $y = -5$

3. $a = 1$

4. $k = -3$

5. $t = 4$

6. $p = 0$

7. $w = 2.5$

8. $c = -3$

Question 3

1. $30 + 2g = 10 + 4g$, so $g = 10$ GB

2. $2n + 8 = 3n - 5$, so $n = 13$

3. $50 + 30w = 20 + 35w$, so $w = 6$ weeks

4. $6x + 8 = 4x + 24$, so $x = 8$

5. It leaves a positive coefficient in front of the variable, so there is no need to divide by a negative at the end.

