

Solving Linear Equations: math practice, Grade 9 – download the PDF

22 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Evaluating expressions



Evaluate each expression for the given value.

- a. $3x + 5$ for $x = 4$
- b. $20 - 2x$ for $x = 6$
- c. $x^2 + x$ for $x = 5$
- d. $4(x - 1)$ for $x = -2$

2 Order of operations



Calculate, following the order of operations.

- a. $6 + 4 \cdot 5$
- b. $(6 + 4) \cdot 5$
- c. $18 - 12 \div 4$
- d. $3 + 2(8 - 5)^2$

3**From words to algebra**

Write an algebraic expression for each phrase.

- a. Seven more than twice a number n .
- b. The product of 5 and the difference of m and 3.
- c. A number k decreased by 9, then divided by 2.

4**One-step equations**

Solve and check.

- a. $x + 9 = 15$
- b. $y - 7 = 12$
- c. $6z = 42$
- d. $\frac{n}{4} = -5$

5**Name the property**

Name the property of equality used in each step.

- a. From $x - 6 = 10$ to $x = 16$.
- b. From $3x = 21$ to $x = 7$.
- c. From $\frac{x}{5} = 4$ to $x = 20$.
- d. From $x + 8 = 3$ to $x = -5$.

6**Two-step equations**

Solve each equation.

a. $3x + 4 = 19$

b. $4y - 6 = 10$

c. $\frac{x}{3} + 2 = 7$

d. $10 - 2k = 4$

7**Gym membership**

A gym charges a \$15 sign-up fee plus \$12 per month. Maya has paid \$87 in total. Write an equation and find how many months she has been a member.

8**Solution on a number line**

Solve $2x + 9 = 3$, then explain where the solution is located on a number line.

9**Distributing first**

Solve each equation.

a. $3(x + 2) = 24$

b. $2(3x - 1) = 28$

c. $5(x - 3) + 2 = 22$

10 Combining like terms



Simplify each side, then solve.

a. $4x + 3 - x + 9 = 30$

b. $7y - 2y + 5 = -10$

c. $8 - 3n + n = 20$

11 Fractions in equations



Solve each equation.

a. $\frac{x}{2} + \frac{x}{3} = 10$

b. $\frac{2x - 1}{3} = 5$

c. $\frac{3}{4}x - 2 = 10$

12 Decimals in equations



Solve each equation.

a. $0.6x + 1.5 = 4.5$

b. $2.4 - 0.5y = 0.9$

13 Variables on both sides



Solve each equation and check your answer.

a. $5x + 2 = 3x + 12$

b. $4n - 7 = 2n + 9$

c. $6 - k = 3k - 10$

14 Find the error

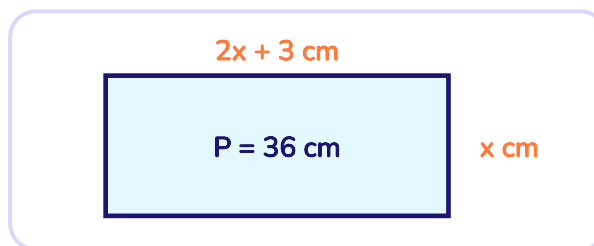
A student solved $3(x - 4) = 2x + 5$ like this:

$3x - 4 = 2x + 5$, then $x - 4 = 5$, so $x = 9$.

Explain the mistake and give the correct solution.

15 Perimeter of a rectangle

A rectangle has length $(2x + 3)$ cm and width x cm. Its perimeter is 36 cm.



Find x , then the length and the width.

16 Rearranging formulas

- Solve $P = 2l + 2w$ for w , then find w when $P = 50$ and $l = 15$.
- Solve $F = 1.8C + 32$ for C , then find C when $F = 86$.
- Solve $y = mx + b$ for x (with $m \neq 0$), then find x when $y = 11$, $m = 2$ and $b = -3$.

17 A general equation

Solve $ax + b = cx + d$ for x , assuming $a \neq c$. Then use the result with $a = 7$, $b = 1$, $c = 3$, $d = 13$.

18 How many solutions?



Decide whether each equation has one solution, no solution or infinitely many solutions. Solve it when there is exactly one.

a. $4(x + 1) = 4x + 7$

b. $3x - 6 = 3(x - 2)$

c. $2x + 5 = 5x - 4$

d. $6(x - 1) - 2x = 4x - 6$

19 Choosing a parameter



Consider the equation $3x + k = 3(x + 4)$, where k is a number.

- a. For which value of k does the equation have infinitely many solutions?
- b. For which values of k does it have no solution?

20 Bike rental



Shop A rents a bike for \$8 plus \$4 per hour. Shop B charges \$20 plus \$2.50 per hour. After how many hours do both shops charge the same amount, and what is that amount?

21 Consecutive odd integers



The sum of three consecutive odd integers is 87. Find the three integers.

22 Fractions on both sides



Solve $\frac{2}{3}(x - 6) = \frac{1}{2}x - 1$.



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