

Solving Linear Equations: practice solutions, Grade 8

– download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Undo a subtraction



Add 7 to both sides: $y = 12 + 7 = 19$.

Check: $19 - 7 = 12$. The solution is $y = 19$.

2 Negative coefficient



Divide both sides by -4 : $a = \frac{36}{-4} = -9$.

Check: $-4 \times (-9) = 36$. The solution is $a = -9$.

3 A basic two-step equation



Subtract 8 from both sides: $3x = 18$.

Divide by 3: $x = 6$. Check: $3 \cdot 6 + 8 = 26$.

4 Dividing first



Add 3 to both sides: $\frac{x}{4} = 5$.

Multiply both sides by 4: $x = 20$. Check: $\frac{20}{4} - 3 = 2$.

5 Subtracting from a number



Subtract 6 from both sides: $-2k = 12$.

Divide by -2 : $k = -6$. Check: $6 - 2(-6) = 6 + 12 = 18$.

6 Is it a solution?



Substitute $x = -3$. Left side: $5(-3) + 7 = -15 + 7 = -8$. Right side:
 $2(-3) - 2 = -6 - 2 = -8$.

Both sides equal -8 , so yes, -3 is a solution.

7 Taxi ride



Let m be the number of miles. Then $3.5 + 2m = 15.5$.

Subtract 3.5: $2m = 12$. Divide by 2: $m = 6$.

Check: $3.5 + 2 \cdot 6 = 15.5$. Maria rode 6 miles.

8 Opening parentheses



Way 1: divide both sides by 4: $x - 3 = 7$, so $x = 10$.

Way 2: distribute: $4x - 12 = 28$, so $4x = 40$ and $x = 10$.

Both ways give $x = 10$. Check: $4(10 - 3) = 28$.

9 Like terms first



Combine like terms: $7x - 9 = 19$.

Add 9: $7x = 28$. Divide by 7: $x = 4$.

Check: $12 + 16 - 9 = 19$.

10 The variable on both sides



Subtract $4x$ from both sides: $5x - 5 = 20$.

Add 5: $5x = 25$. Divide by 5: $x = 5$.

Check: $9 \cdot 5 - 5 = 40$ and $4 \cdot 5 + 20 = 40$.

11 A minus sign before parentheses



Distribute -3 : $6 - 3x - 3 = 15$, so $3 - 3x = 15$.

Subtract 3: $-3x = 12$. Divide by -3 : $x = -4$.

Check: $6 - 3(-4 + 1) = 6 - 3(-3) = 6 + 9 = 15$.

12 Find the error



After subtracting $2x$, the variable has disappeared and the statement $1 = 3$ is **false**. It says nothing about x , so writing $x = 1$ is not justified.

The correct conclusion is that the equation has **no solution**: $2x + 1$ is always 2 less than $2x + 3$, so the two sides can never be equal.

13 Equation with a fraction bar



Multiply both sides by 5: $2x - 1 = 15$.

Add 1: $2x = 16$. Divide by 2: $x = 8$.

Check: $\frac{2 \cdot 8 - 1}{5} = \frac{15}{5} = 3$.

14 Garden perimeter



Let w be the width in feet; the length is $w + 3$. The perimeter is $2w + 2(w + 3) = 46$.

Simplify: $4w + 6 = 46$, so $4w = 40$ and $w = 10$.

The garden is **10 ft wide and 13 ft long**. Check: $2 \cdot 10 + 2 \cdot 13 = 46$.

15 Fahrenheit and Celsius



Replace F by 95: $95 = 1.8C + 32$.

Subtract 32: $63 = 1.8C$. Divide by 1.8: $C = 35$.

Check: $1.8 \cdot 35 + 32 = 63 + 32 = 95$. The temperature is **35°C** .

16 Distribute on both sides



Left side: $10x - 15 - 4x = 6x - 15$. Right side: $3x + 12 + 6 = 3x + 18$.

So $6x - 15 = 3x + 18$. Subtract $3x$: $3x - 15 = 18$. Add 15: $3x = 33$. So $x = 11$.

Check: left $5 \cdot 19 - 44 = 51$; right $3 \cdot 15 + 6 = 51$.

17 Fractions on both sides



Multiply every term by 4: $3x + 8 = x + 14$.

Subtract x : $2x + 8 = 14$. Subtract 8: $2x = 6$. So $x = 3$.

Check: left $\frac{9}{4} + 2 = \frac{17}{4}$; right $\frac{3}{4} + \frac{14}{4} = \frac{17}{4}$.

18 Decimals and parentheses



Distribute: $0.6x - 3 = 0.2x + 1$.

Subtract $0.2x$: $0.4x - 3 = 1$. Add 3: $0.4x = 4$. Divide by 0.4: $x = 10$.

Check: left $0.6 \cdot 5 = 3$; right $2 + 1 = 3$.

19 How many solutions?



Distribute: $2x + 6 = 2x + c$. Subtract $2x$: $6 = c$.

- If $c = 6$, the statement $6 = 6$ is true for every x : **infinitely many solutions**.
- If $c \neq 6$, the statement $6 = c$ is false: **no solution**.
- No. The variable always cancels, so we only get a true or a false statement, never a value of x .

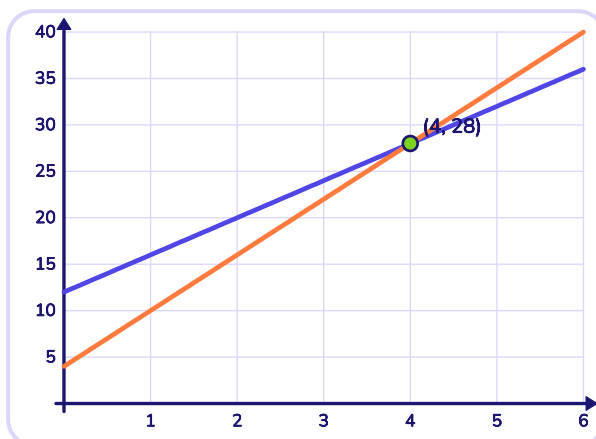
20 Bike rental showdown

★★★

Let h be the number of hours: $12 + 4h = 4 + 6h$.

Subtract $4h$: $12 = 4 + 2h$. Subtract 4: $8 = 2h$. So $h = 4$.

Cost: $12 + 4 \cdot 4 = 28$ and $4 + 6 \cdot 4 = 28$. After **4 hours** both cost **\$28**; the graphs cross at **(4, 28)**. For a shorter rental Shop B is cheaper, for a longer one Shop A is cheaper.



21 Consecutive integers

★★★

Let the integers be n , $n + 1$, $n + 2$. Then $n + (n + 1) + (n + 2) = 4n - 9$.

Simplify: $3n + 3 = 4n - 9$, so $12 = n$.

The integers are **12, 13, and 14**. Check: $12 + 13 + 14 = 39$ and $4 \cdot 12 - 9 = 39$.

22 Fractions of expressions

★★★

Multiply every term by 4: $2(x - 1) = (x + 3) + 4$.

Distribute: $2x - 2 = x + 7$. Subtract x : $x - 2 = 7$. So $x = 9$.

Check: left $\frac{8}{2} = 4$; right $\frac{12}{4} + 1 = 4$.



Test yourself: quick challenge for Grade 8

[Change level](#)

Level : **Grade 8**

6 random questions, instant feedback.



Start the challenge



Keep exploring with Zyro



Math practice

Solving Linear Equations: math practice,
Grade 8



Math quizzes

Solving Linear Equations: math quiz,
Grade 8



Math tests



Math practice

Solving Linear Equations: math test,
Grade 8

Proportional Relationships and Slope:
math practice, Grade 8

 **Math practice**

Graphing Linear Equations: math
practice, Grade 8

 **Math quizzes**

Proportional Relationships and Slope:
math quiz, Grade 8

Zyro vous emmène sur nos sites partenaires

Embarquez pour d'autres planètes du savoir et leurs applis.

Décollage