

Grade 8 · Solving Linear Equations · Worksheet Answer Key

Common Core 8.EE.C.7a, 8.EE.C.7b · mathovore.fr

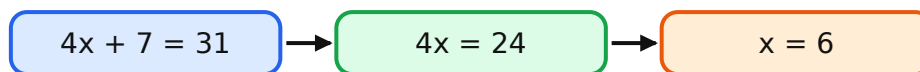
Every solution below shows each step and a check by substitution, so compare your method as well as your final answer. Final answers are in bold. If your answer differs, substitute it into the original equation and see which side comes out wrong.

Grade 8 Common Core: 8.EE.C.7a · 8.EE.C.7b

Problem 1: Add then multiply

Subtract 7 from both sides: $4x = 24$. Divide both sides by 4: $x = 6$.

Check: $4(6) + 7 = 31$. Solution: $x = 6$.



Subtract 7, then divide by 4.

Problem 2: Negative coefficient

Subtract 8: $-3x = -18$. Divide by -3 : $x = 6$.

Check: $-3(6) + 8 = -10$. Solution: $x = 6$.

Problem 3: Fraction coefficient

Add 3: $\frac{x}{4} = 8$. Multiply both sides by 4: $x = 32$.

Check: $\frac{32}{4} - 3 = 5$. Solution: $x = 32$.

Problem 4: Distribute first

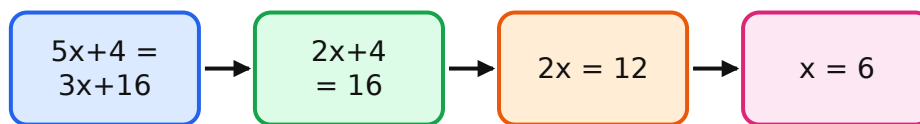
Distribute: $6x - 3 = 45$. Add 3: $6x = 48$. Divide by 6: $x = 8$.

Check: $3(2 \cdot 8 - 1) = 3(15) = 45$. Solution: $x = 8$.

Problem 5: Variables on both sides

Subtract $3x$ from both sides: $2x+4=16$. Subtract 4: $2x=12$. Divide by 2: $x=6$.

Check: $5(6)+4=34$ and $3(6)+16=34$. Solution: $x=6$.



Subtract $3x$, subtract 4, divide by 2.

Problem 6: Collect the x terms

Subtract $4x$: $3x-2=13$. Add 2: $3x=15$. Divide by 3: $x=5$.

Check: $7(5)-2=33$ and $4(5)+13=33$. Solution: $x=5$.

Problem 7: Variable with a negative

Add $2x$ to both sides: $9=3x+21$. Subtract 21: $-12=3x$. Divide by 3: $x=-4$.

Check: $9-2(-4)=17$ and $-4+21=17$. Solution: $x=-4$.

Problem 8: Distribute and collect

Distribute: $4x-12=2x+6$. Subtract $2x$: $2x-12=6$. Add 12: $2x=18$. Divide by 2: $x=9$.

Check: $4(9-3)=24$ and $2(9)+6=24$. Solution: $x=9$.

Problem 9: Combine like terms

Distribute: $3x+2x-8=17$. Combine like terms: $5x-8=17$. Add 8: $5x=25$. Divide by 5: $x=5$.

Check: $3(5)+2(1)=17$. Solution: $x=5$.

Problem 10: Fraction equation

Subtract 1: $\frac{2}{3}x=8$. Multiply by $\frac{3}{2}$: $x=8 \times \frac{3}{2}=12$.

Check: $\frac{2}{3}(12)+1=9$. Solution: $x=12$.

Problem 11: Fractions on both sides

Subtract $\frac{1}{4}x$: $\frac{1}{4}x-3=2$. Add 3: $\frac{1}{4}x=5$. Multiply by 4: $x=20$.

Check: $\frac{1}{2}(20)-3=7$ and $\frac{1}{4}(20)+2=7$. Solution: $x=20$.

Problem 12: Decimal equation

Subtract $0.1x$: $0.3x + 1.5 = 4.8$. Subtract 1.5: $0.3x = 3.3$. Divide by 0.3: $x = 11$.

Check: $0.4(11) + 1.5 = 5.9$ and $0.1(11) + 4.8 = 5.9$. Solution: $x = 11$.

Problem 13: Fraction times parentheses

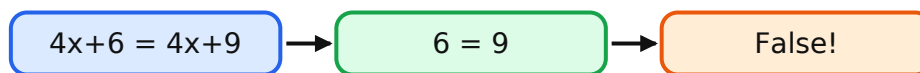
Multiply both sides by $\frac{4}{3}$: $x - 8 = 12$. Add 8: $x = 20$.

Check: $\frac{3}{4}(20 - 8) = \frac{3}{4}(12) = 9$. Solution: $x = 20$.

Problem 14: No solution

Subtract $4x$ from both sides: $6 = 9$. This statement is false for every value of x .

No solution.



The variable cancels and the statement is false.

Problem 15: Infinitely many

Distribute: $3x + 6 = 3x + 6$. Subtract $3x$: $6 = 6$. This statement is true for every value of x .

Infinitely many solutions. Any number works.

Problem 16: Sort the equations

- $5x - 5 = 2x + 10$, so $3x = 15$ and $x = 5$. **One solution**, $x = 5$.
- Subtract $7x$: $-3 = 2$, which is false. **No solution**.
- $8x + 6 = 8x + 6$, which is always true. **Infinitely many solutions**.

Problem 17: Gym memberships

Jamal: $15 + 4v$. Sofia: $9 + 6v$. Set them equal: $15 + 4v = 9 + 6v$.

Subtract $4v$: $15 = 9 + 2v$. Subtract 9: $6 = 2v$. So $v = 3$.

Cost: $15 + 4(3) = 27$. After **3 visits**, both cost **\$27**.

Problem 18: Taxi rates

Cab A: $3.5 + 2m$. Cab B: $2 + 2.5m$. Set equal: $3.5 + 2m = 2 + 2.5m$.

Subtract $2m$: $3.5 = 2 + 0.5m$. Subtract 2: $1.5 = 0.5m$. Divide by 0.5: $m = 3$.

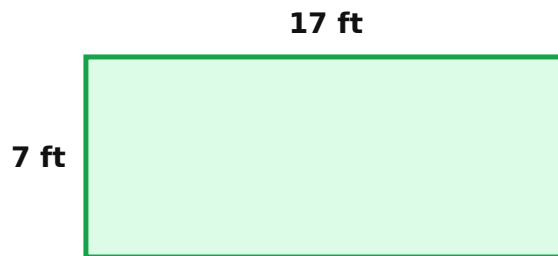
Fare: $3.5 + 2(3) = 9.5$. At **3 miles**, both cost **\$9.50**.

Problem 19: Rectangle perimeter

Perimeter = $2(\text{length} + \text{width})$: $2(2x + 3 + x) = 48$. Combine: $2(3x + 3) = 48$, so $6x + 6 = 48$.

Subtract 6: $6x = 42$. Divide by 6: $x = 7$.

Width = 7 ft, length = $2(7) + 3 = 17$ ft. Check: $2(17 + 7) = 48$. Answer: $x = 7$, **17 ft by 7 ft**.



The solved rectangle.

Problem 20: Saving up

Aisha: $40 + 12w$. Diego: $100 + 7w$. Set equal: $40 + 12w = 100 + 7w$.

Subtract $7w$: $40 + 5w = 100$. Subtract 40: $5w = 60$. Divide by 5: $w = 12$.

Amount: $40 + 12(12) = 184$. After **12 weeks**, each has **\$184**.

Problem 21: Number puzzle

Let n be the number: $3(n + 4) = 5n - 6$. Distribute: $3n + 12 = 5n - 6$.

Subtract $3n$: $12 = 2n - 6$. Add 6: $18 = 2n$. Divide by 2: $n = 9$.

Check: $3(13) = 39$ and $5(9) - 6 = 39$. The number is **9**.

Problem 22: Burning candles

Candle A: $12 - 0.5h$. Candle B: $9 - 0.25h$. Set equal: $12 - 0.5h = 9 - 0.25h$.

Add $0.5h$: $12 = 9 + 0.25h$. Subtract 9: $3 = 0.25h$. Divide by 0.25: $h = 12$.

Height: $12 - 0.5(12) = 6$. After **12 hours**, both are **6 inches** tall.

Hours	Candle A	Candle B
0	12 in	9 in
6	9 in	7.5 in
12	6 in	6 in

Heights meet at 12 hours.