

Solving Two-Step Equations with Rational Numbers

Grade 7 math · Worksheet Answer Key · Standards: 7.EE.B.3, 7.EE.B.4a

Every answer shows each undoing step in order, then a check in the original equation. If your answer differs, retrace the steps and look for an operation applied to only one side or a lost negative sign.

Standards: 7.EE.B.3, 7.EE.B.4a · **Level:** Grade 7

Problem 1 Add, Then Multiply

Subtract 5: $3x = 24$. Divide by 3: $x = 8$. Check: $3(8) + 5 = 29$.

$x = 8$

Problem 2 Subtract, Then Multiply

Add 4: $5x = 35$. Divide by 5: $x = 7$. Check: $5(7) - 4 = 31$.

$x = 7$

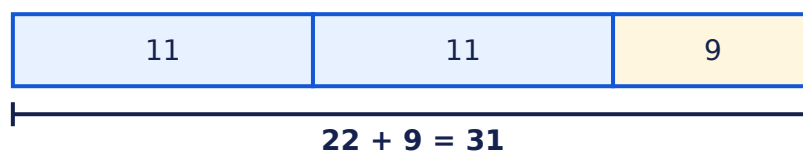
Problem 3 A Quotient Plus a Constant

Subtract 3: $\frac{x}{4} = 6$. Multiply by 4: $x = 24$. Check: $24 \div 4 + 3 = 9$.

$x = 24$

Problem 4 Read the Tape Diagram

The two equal parts together are $31 - 9 = 22$, so each part is $22 \div 2 = 11$. Algebra: $2x = 22$ and $x = 11$.



Each part is 11.

$$x = 11$$

Problem 5 A Negative Coefficient

Subtract 6: $-4x = 24$. Divide by -4 : $x = -6$. Check: $-4(-6) + 6 = 24 + 6 = 30$.

$$x = -6$$

Problem 6 Decimal Coefficient

Add 3.5: $2.5x = 15$. Divide by 2.5: $x = 6$. Check: $2.5(6) - 3.5 = 15 - 3.5 = 11.5$.

$$x = 6$$

Problem 7 Fraction Coefficient

Subtract 5: $\frac{7}{8}x = 14$. Multiply by $\frac{8}{7}$: $x = 16$. Check: $\frac{7}{8}(16) + 5 = 14 + 5 = 19$.

$$x = 16$$

Problem 8 Two Ways with Parentheses

Divide first: $x + 3 = 9$, so $x = 6$.

Distribute first: $4x + 12 = 36$, so $4x = 24$ and $x = 6$.

$x = 6$ by both methods.

Problem 9 Negative Factor Outside

Divide by -2 : $x - 5 = -9$. Add 5: $x = -4$. Check: $-2(-4 - 5) = -2(-9) = 18$.

$$x = -4$$

Problem 10 Decimal Factor Outside

Divide by 0.4: $x - 3 = 7$. Add 3: $x = 10$. Check: $0.4(7) = 2.8$.

$$x = 10$$

Problem 11 Negative Quotient

Add 4: $-\frac{x}{3} = 6$. Multiply by -3 : $x = -18$. Check: $-(-18) \div 3 - 4 = 6 - 4 = 2$.

$x = -18$

Problem 12 Variable on the Right

Subtract 2.6: $1.3x = -7.8$. Divide by 1.3: $x = -6$. Check: $2.6 + 1.3(-6) = 2.6 - 7.8 = -5.2$.

$x = -6$

Problem 13 Fractions Inside and Out

Multiply by $\frac{3}{2}$: $x + \frac{3}{4} = \frac{15}{4}$. Subtract $\frac{3}{4}$: $x = \frac{12}{4} = 3$. Check: $\frac{2}{3} \cdot \frac{15}{4} = \frac{30}{12} = \frac{5}{2}$.

$x = 3$

Problem 14 Arithmetic and Algebra

Arithmetic: add 3.5 to get 24, then divide by 6 to get 4.



Working backward.

Algebra: $6x - 3.5 = 20.5$, so $6x = 24$ and $x = 4$.

The number is 4

Problem 15 Summer Camp Cost

Let $w =$ weeks: $85w + 60 = 485$. Estimate: $485 - 60 \approx 425$, and $425 \div 85$ is 5.

Solve: $85w = 425$, so $w = 5$. Check: $85(5) + 60 = 485$.

Weeks	4	5
Cost (dollars)	400	485

Week 5 reaches \$485.

5 weeks

Problem 16 Hours at the Food Truck

$9.75h + 30 = 108$. Subtract 30: $9.75h = 78$. Divide: $h = 8$. Check: $9.75(8) = 78$ and $78 + 30 = 108$.

8 hours

Problem 17 Fencing a Rectangle

Perimeter = $2(x + 6.5) = 31$. Divide by 2: $x + 6.5 = 15.5$. Subtract: $x = 9$.

Check: $2(9 + 6.5) = 2(15.5) = 31$.

9 feet

Problem 18 Fahrenheit and Celsius

$77 = 1.8C + 32$. Subtract 32: $45 = 1.8C$. Divide by 1.8: $C = 25$. Check: $1.8(25) + 32 = 45 + 32 = 77$.

25°C

Problem 19 Group Tickets with a Fee

Each ticket with fee costs about $87 \div 6 \approx 14.5$, so t is about 12.

$6(t + 2.5) = 87$. Divide by 6: $t + 2.5 = 14.5$. Subtract: $t = 12$. Check: $6(14.5) = 87$.

\$12 per ticket

Problem 20 Descending the Trail

$1,240 - 36m = 340$. Subtract 1,240: $-36m = -900$. Divide by -36 : $m = 25$.

Check: $1,240 - 36(25) = 1,240 - 900 = 340$.

25 minutes of descent bring the hiker to 340 feet.