

Rewriting Linear Expressions in Equivalent Forms

Grade 7 math · Worksheet Answer Key · Standards: 7.EE.A.1, 7.EE.A.2

Each answer shows the distribution, the grouping of like terms and the final expression in bold. When your result differs, substitute a number for the variable in both forms to see which step went wrong.

Standards: 7.EE.A.1, 7.EE.A.2 · **Level:** Grade 7

Problem 1 Combine Three Like Terms

The terms are all like terms, so combine the coefficients: $9 + 4 - 3 = 10$.

$10y$

Problem 2 Expand a Sum

$6 \cdot x = 6x$ and $6 \cdot 7 = 42$.

$6x + 42$

Problem 3 Expand a Difference

$5 \cdot 2a = 10a$ and $5 \cdot 3 = 15$, keeping the minus sign.

$10a - 15$

Problem 4 Test for Equivalence

The first row gives 14, 21, 28, 35 and the second row gives 2, 9, 16, 23. The values differ in every column, so Jaylen is wrong. The correct expansion is $7x + 14$.

x	0	1	2	3
$7(x + 2)$	14	21	28	35
$7x + 2$	2	9	16	23

Completed table of values.

Not equivalent

Problem 5 Expand with a Negative Factor

$$-3 \cdot 4x = -12x \text{ and } -3 \cdot (-5) = +15.$$

$$\mathbf{-12x + 15}$$

Problem 6 Combine Terms in Four Pieces

$$x \text{ terms: } 8 + 2 - 5 = 5. \text{ Constants: } -3 + 11 = 8.$$

$$\mathbf{5x + 8}$$

Problem 7 Expand with a Fraction

$$\frac{3}{4} \cdot 8x = 6x \text{ and } \frac{3}{4} \cdot 12 = 9.$$

$$\mathbf{6x - 9}$$

Problem 8 Expand with a Decimal

$$-0.5 \cdot 6x = -3x \text{ and } -0.5 \cdot 9.2 = -4.6.$$

$$\mathbf{-3x - 4.6}$$

Problem 9 Factor from an Area Model

The GCF of 18 and 24 is 6, which becomes the height. The widths are $18x \div 6 = 3x$ and $24 \div 6 = 4$.



Height 6, widths 3x and 4.

$$\mathbf{6(3x + 4)}$$

Problem 10 Factor with a Negative GCF

Factor out -4 : $-8x \div (-4) = 2x$ and $-20 \div (-4) = 5$. Check: $-4 \cdot 2x = -8x$ and $-4 \cdot 5 = -20$.

$-4(2x + 5)$

Problem 11 Subtract an Expression

Subtracting flips both signs: $3x + 2 - 5x + 7$. Then $3x - 5x = -2x$ and $2 + 7 = 9$.

$-2x + 9$

Problem 12 Add Fractional Coefficients

x terms: $\frac{2}{3} + \frac{1}{3} = 1$. Constants: $\frac{1}{4} - \frac{3}{4} = -\frac{1}{2}$.

$x - \frac{1}{2}$

Problem 13 Two Distributions Then Combine

First part: $8x - 12$. Second part: $6x + 9$. Combine: $8x + 6x = 14x$ and $-12 + 9 = -3$.

$14x - 3$

Problem 14 Factor a Decimal Expression

$1.5x \div 1.5 = x$ and $4.5 \div 1.5 = 3$. Check: $1.5 \cdot x = 1.5x$ and $1.5 \cdot 3 = 4.5$.

$1.5(x - 3)$

Problem 15 Perimeter of a Garden

Fencing = $2(5x + 1) + 2(2x + 4) = 10x + 2 + 4x + 8 = 14x + 10$.

For $x = 2$: sides 11 ft and 8 ft, so $2(11 + 8) = 38$, and $14(2) + 10 = 38$.

$14x + 10$ feet; 38 feet when $x = 2$

Problem 16 Price with Sales Tax

Total = $p + 0.08p = 1.08p$. For $p = 45$: $1.08 \times 45 = 48.60$.

$1.08p$; \$48.60

Problem 17 Clearance Discount

Sale price = $p - 0.35p = 0.65p$. For $p = 80$: $0.65 \times 80 = 52$.

$0.65p$; \$52

Problem 18 Fundraiser Revenue

Revenue = $15x + 25(x - 4) = 15x + 25x - 100 = 40x - 100$.

For $x = 18$: shirts 270 and hats $25 \cdot 14 = 350$, total 620. Also $40(18) - 100 = 620$.

$40x - 100$ dollars; \$620 when $x = 18$

Problem 19 Find the Error

Expand: $6x - 12 - 2x + 10 = 4x - 2$, so Ines is correct.

Check $x = 3$: original $3(2) - 2(-2) = 6 + 4 = 10$; Ines: $4(3) - 2 = 10$; Cal: $12 - 22 = -10$.

Cal treated $-2 \cdot (-5)$ as -10 instead of $+10$.

Ines is correct: $4x - 2$

Problem 20 Three Trail Sections

Section 2 = $\frac{3}{4}(2x + 1.5) = 1.5x + 1.125$. Section 3 = $(2x + 1.5) - (x - 0.25) = x + 1.75$.

Total: $2x + 1.5 + 1.5x + 1.125 + x + 1.75 = 4.5x + 4.375$.

For $x = 2$: sections are 5.5, 4.125 and 3.75 miles, total 13.375.

$4.5x + 4.375$ miles; 13.375 miles when $x = 2$