

Equivalent Algebraic Expressions: math practice, Grade 7 – download the PDF

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

1 Parts of an expression



Look at $7x - 4y + 9$.

- List its terms.
- Give the coefficient of each variable term.
- Which term is the constant?

2 Combine like terms: one variable



Simplify.

- $6n + 4n$
- $11p - 7p$
- $3k + k$
- $8t - 8t$

3 Simplify with constants



Simplify each expression by combining like terms.

a. $4x + 7 + 2x + 1$

b. $9a + 5 - 3a - 2$

c. $10 + 6b - 4 - b$

4 Apply the distributive property



Expand.

a. $3(x + 5)$

b. $6(y - 2)$

c. $2(4a + 1)$

d. $5(3 - m)$

5 True or false? Test with a number



Decide whether each statement is always true. Justify by substituting a value or by simplifying.

a. $4x + 3 = 7x$

b. $2(x + 1) = 2x + 2$

c. $5x - x = 5$

d. $x + x = x^2$

6 Factor a common number



Factor out the greatest common factor.

a. $4x + 8$

b. $9y - 6$

c. $10a + 15$

d. $7m + 7$

7 Phone plan



A phone plan costs 25 dollars per month plus 3 dollars for each gigabyte g of extra data.

a. Write an expression for the monthly cost.

b. Find the cost when $g = 5$.

8 Several variables



Simplify.

a. $5x - 3y + 2x + 7y$

b. $-4a + 9 - 6a - 12$

c. $2.5k + 4 - 0.5k - 1.5$

9 Fraction coefficients



Simplify.

a. $\frac{1}{2}x + \frac{3}{2}x$

b. $\frac{2}{3}y + \frac{1}{3}y - 5$

c. $\frac{3}{4}a - \frac{1}{4}a$

10**Distribute with negatives and decimals**

Expand.

a. $-2(x + 6)$

b. $-3(4y - 5)$

c. $0.5(6a + 10)$

d. $-(m - 8)$

11**Expand, then combine**

Simplify.

a. $3(x + 4) + 2x$

b. $5(2y - 1) - 4y$

c. $2(a + 3) + 3(a - 1)$

d. $4(m + 2) - 2(m + 5)$

12**Factor with several terms**

Factor out the GCF and check by expanding.

a. $12x + 18$

b. $8y - 20$

c. $15a + 25b$

d. $6m - 9n + 12$

13 Add and subtract expressions



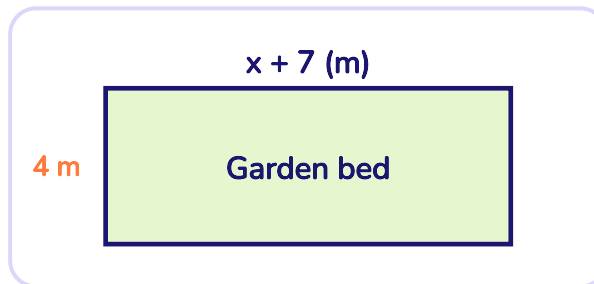
Simplify.

- a. $(3x + 5) + (2x - 8)$
- b. $(7a - 2) + (-3a + 6)$
- c. $(6x + 7) - (2x + 3)$
- d. $(8m + 2) - (10m - 6)$

14 Garden bed



A garden bed is 4 meters wide and $x + 7$ meters long.



- a. Write the area as a product, then expand it.
- b. Write and simplify the perimeter.
- c. Find both when $x = 5$.

15 Which are equivalent?



Which of these are equivalent to $2(3x - 4)$? Explain.

- a. $6x - 8$
- b. $6x - 4$
- c. $2 \cdot 3x - 8$
- d. $5x - 8$

16 Find the mistake



Two students made errors. Explain each and correct it.

a. Sam wrote $4(x + 3) = 4x + 3$.

b. Lena wrote $7 - 2(x + 1) = 5(x + 1)$.

17 Theater tickets



An adult ticket costs a dollars and a child ticket costs 5 dollars less. A family buys 2 adult tickets and 3 child tickets.

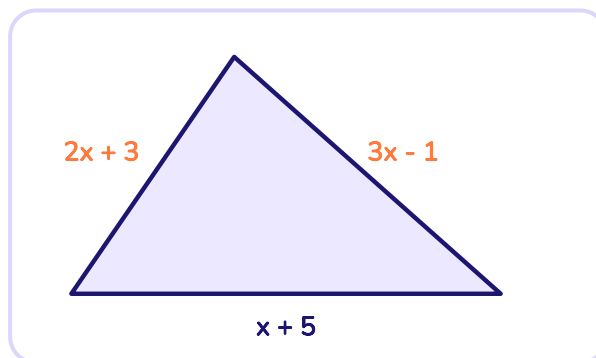
a. Write and simplify an expression for the total.

b. Find the total when $a = 12$.

18 Perimeter of a triangle



The sides of a triangle measure $2x + 3$, $x + 5$, and $3x - 1$ centimeters.



a. Write the perimeter in simplest form.

b. Find the perimeter when $x = 4$.

19 Stickers

Mia has $5n + 12$ stickers. She gives away $2n + 5$ stickers.

- Write an expression for the stickers she has left.
- Find the number left when $n = 6$.

20 Fully factored?

Two students factored $18x + 24$: Ava wrote $2(9x + 12)$ and Ben wrote $6(3x + 4)$.

- Show that both are equivalent to $18x + 24$.
- Whose answer is fully factored? Why?
- Factor $12a - 30b + 18$ completely.

21 Prove equivalence

- Show that $3(2x + 1) - (x - 4)$ is equivalent to $5x + 7$.
- Simplify $2(3x - 1) + 4(x + 2)$, then factor the result.

22 Two gyms

Gym A charges 20 dollars to join plus 12 dollars per month: $20 + 12m$. Gym B advertises $12(m + 1) + 8$ dollars for m months.

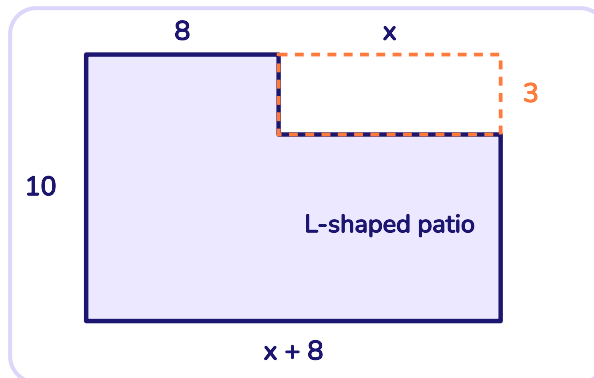
- Show that the two prices are equivalent.
- Interpret the form $12(m + 1) + 8$ in words.
- Find the cost for 6 months.

23

L-shaped patio

★★★

A patio is a rectangle 10 feet wide and $x + 8$ feet long, with a 3 foot by x foot corner removed.



- Write an expression for the area and simplify it.
- Find the area when $x = 5$.

24

Find the missing number

★★★

Find the number k that makes each statement true for every x .

- $4(x + k) + 2x = 6x + 20$
- $3(2x + k) - x = 5x + 12$


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