

Simplifying Algebraic Expressions

Simplify each expression. Then write the coefficient of the variable in the expression.

Example

$$s + s + s = \underline{3} \cdot s$$

$$= \underline{3s}$$

In the term $\underline{3s}$, the coefficient of s is $\underline{3}$.

$6 + 6 + 6 = 3 \cdot 6$
 $s + s + s = 3 \cdot s$
 $3 \cdot s$ is the same as $3s$.



1. $p + p + p + p + p + p = \underline{\hspace{2cm}} \cdot p$

$= \underline{\hspace{2cm}}$

In the term $\underline{\hspace{2cm}}$, the coefficient of p is $\underline{\hspace{2cm}}$.

2. $n + n + n + 13 + 8 = \underline{\hspace{2cm}} \cdot n + 13 + 8$

$= \underline{\hspace{2cm}} + 21$

In the term $\underline{\hspace{2cm}}$, the coefficient of n is $\underline{\hspace{2cm}}$.

3. $d + d + d + d + d + 5 - 2 = \underline{\hspace{2cm}} \cdot d + 5 - 2$

$= \underline{\hspace{2cm}} + 3$

In the term $\underline{\hspace{2cm}}$, the coefficient of d is $\underline{\hspace{2cm}}$.

State whether each pair of expressions is equivalent.

14. $7p + 2p$ and $3p + 6p$

15. $9r + 3r$ and $5r + 3r$

State whether each pair of expressions is equivalent.

23. $5n - n$ and $6n$

24. $4e - 4e$ and $10w - 10w$

25. $7a - 2a$ and $9a - 4a$

26. $9u$ and $12u - 2u$

Simplify each expression.

Example

$$8 + 5g - 2 + 6g$$

$$= \underline{5g + 6g} + \underline{8 - 2}$$

$$= \underline{11g + 6}$$

First, identify like terms. Then change the order of terms to collect like terms. Lastly, simplify.



31. $5t + 4 + 2t$

$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

$= \underline{\hspace{2cm}}$

32. $6m - 10 - 2m - m$

$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

$= \underline{\hspace{2cm}}$

33. $7r + 5r - 12$

34. $8 + 3j - 5 - 2j + 8j$

Solve each problem.

35. Kevin works $3x$ hours each day from Monday to Friday. He works $(4x-7)$ on Saturday. Kevin does not work on Sunday. Find the number of hours Kevin works in one week in terms of x .

36. Brie leaves her home and cycles $4y$ miles south, then cycles $(3y+9)$ miles east. Then, she cycles $(5y+7)$ miles south and reaches her school. How far does she cycle?

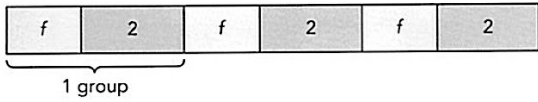
Expanding Algebraic Expressions

Expand each expression.

Example

$$3(f + 2)$$

$3(f + 2)$ means 3 groups of $(f + 2)$:



$$3(f + 2) = 3 \cdot (f + 2)$$

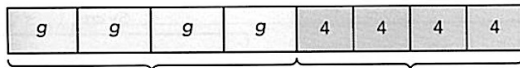
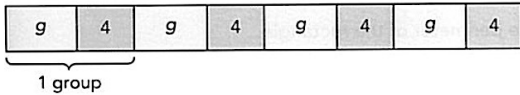
$$= \underline{3 \cdot f} + \underline{3 \cdot 2}$$

$$= \underline{3f + 6}$$

$3(f + 2)$ is the same as $3 \cdot (f + 2)$.
 $3 \cdot (f + 2)$
 $= (f + 2) + (f + 2) + (f + 2)$
 $= f + f + f + 2 + 2 + 2$
 $= 3f + 6$



1. $4(g + 4)$



$$4(g + 4) = 4 \cdot (g + 4)$$

$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

2. $2(h + 7)$

3. $9(k - 4)$

4. $6(7s + 9)$

5. $3(9c - 6)$

Factoring Algebraic Expressions

Factor each expression.

Example

$$4y + 2$$

The factors of $4y$ are:

The factors of 2 are:

$$1 \cdot 4y$$

$$1 \cdot 2$$

$$2 \cdot \underline{2y}$$

$$4 \cdot \underline{1y}$$

The common factor of $4y$ and 2 is 2.

$$4y = \underline{2} \cdot \underline{2y}$$

$$2 = \underline{2} \cdot \underline{1}$$

$$4y + 2 = \underline{2} \cdot \underline{2y} + \underline{2} \cdot \underline{1}$$

$$= \underline{2(2y + 1)}$$

To factor an expression, look for common factors in the terms of the expression.



10. $3d + 9$

The factors of $3d$ are:

The factors of 9 are:

$$1 \cdot 3d$$

$$1 \cdot 9$$

$$3 \cdot \underline{\hspace{1cm}}$$

$$3 \cdot \underline{\hspace{1cm}}$$

$$9 \cdot \underline{\hspace{1cm}}$$

The common factor of $3d$ and 9 is .

$$3d = \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}}$$

$$9 = \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}}$$

$$3d + 9 = \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}} + \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}}$$

$$= \underline{\hspace{2cm}}$$

11. $24g + 8$