

Collecting Like Terms

'Terms' are objects that are added or subtracted. 'Like terms' are those that have the same algebraic (letter) parts. For instance, $15ab$ and $-4ab$ are like terms, but $15a$ and $-4b$ are not like terms.

We can only 'collect' like terms.

Recall that the number in front of the letter part signifies how many we have added together. That is, $3xy$ represents $xy + xy + xy$. Also note that x signifies $1x$.

Example 1

Consider the expression $12 + 4P - 13L - P + 3L + 10$.

Notice the 12 and the 10 are like terms, the $4P$ and $-P$ are like terms, and the $-13L$ and $3L$ are like terms. So, by collecting like terms:

$$\begin{aligned} 12 + 4P - 13L - P + 3L + 10 &= (12 + 10) + (4P - P) + (-13L + 3L) \\ &= 22 + 3P - 10L \end{aligned}$$

Terms with powers

Recall that powers/exponents/indices signify how many we have multiplied together. That is, ab^2c^3 represents $a \cdot b \cdot b \cdot c \cdot c \cdot c$. This means that even though x^2y^3 and x^3y^2 both have x 's and y 's, they are not like terms since the first represents $x \cdot x \cdot y \cdot y \cdot y$ and the second represents $x \cdot x \cdot x \cdot y \cdot y$.

Example 2

By collecting like terms, simplify $4ar^2 - 4ar + 3arr - ra + a^2r + ar^2$.

$$\begin{aligned} 4ar^2 - 4ar + 3arr - ra + a^2r &= (4ar^2 + 3arr + ar^2) + (-4ar - ra) + a^2r \\ &= 8ar^2 - 5ar + a^2r \end{aligned}$$



Exercises

Simplify the following expressions by collecting like terms

- a) $9 + x + x$
- b) $P + 2P + 3P + 4 + 5$
- c) $x + y + 2x - 10y$
- d) $2 + 3n + n - 5a - a + 3$
- e) $15n^2 - 15 + an^2 + 10 - 2an^2$
- f) $6xy^2z - 16xyz + 2xyyz + 10zyx$
- g) $a - 2b + 3a - 4c + 5c + 6b$
- h) $-5 - 20mn + 17x + 3mn - 20x + 15$
- i) $a^3b^2 - ab + 8 + 3a^3b^2 + a^2b^4 - 3 - a^3b^2 + 9a^2b^4 - ab$

Answers

- a) $9 - 2x$
- b) $6P + 9$
- c) $3x - 9y$
- d) $5 + 4n - 6a$
- e) $15n^2 - 5 - an^2$
- f) $8xy^2z - 6xyz$
- g) $4a + 4b + c$
- h) $10 - 17mn - 3x$
- i) $3a^3b^2 - 2ab + 5 + 10a^2b^4$