

Collect Like Terms/equations 1. $-3x+5-6x^2$.

$21+4a-133$. $21+4a-134$. $15-10b+6b=-55$.

$-20=4c+30-2c$

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When working with algebraic expressions and equations, one of the most fundamental skills students need to master is collecting like terms. This process simplifies complex expressions and makes solving equations more manageable. In this article, we will explore how to collect like terms in various algebraic expressions and equations, focusing on examples such as $-3x + 5 - 6x^2$, $21 + 4a - 133$, $21 + 4a - 134$, $15 - 10b + 6b = -55$, and $-20 = 4c + 30 - 2c$. Understanding these examples will help you develop a systematic approach to simplifying and solving algebraic problems effectively.

What Does It Mean to Collect Like Terms?

Definition of Like Terms

Like terms are terms in an algebraic expression that have the same variable raised to the same power. The coefficients of these terms can be different, but the variables and their exponents must match exactly for the terms to be considered like terms.

Purpose of Collecting Like Terms

The primary goal of collecting like terms is to simplify algebraic expressions. By combining similar terms, you reduce the expression to its simplest form, which makes solving equations easier and more straightforward.

Step-by-Step Process of Collecting Like Terms

Identify Like Terms

- Look for terms with the same variable and exponent.
- Ignore coefficients initially; focus on variables and exponents.

Combine Like Terms

- Add or subtract the coefficients of like terms.
- Keep the variable and exponent unchanged.

Simplify the Expression

- Write the combined terms in a simplified form.
- Rearrange the expression for clarity if necessary.

Applying Collecting Like Terms to Specific Examples

Example 1: Simplifying $-3x + 5 - 6x^2$

- Identify like terms:
- $-3x$ (variable term with x)
- 5 (constant term)
- $-6x^2$ (variable term with x^2)
- Note: The terms $-3x$ and $-6x^2$ are not like because their variables have different exponents.
- Combine constants: 5 remains as is.
- Express simplified form:
- The expression is already simplified because no like terms can be combined:

$$-3x - 6x^2 + 5$$

Example 2: Simplifying $21 + 4a - 133$

- Identify like terms:
- 21 and -133 are constants.
- $4a$ is a variable term.
- Combine constants:
- $21 - 133 = -112$
- Final simplified form:

$$-112 + 4a$$

Example 3: Simplifying $21 + 4a - 134$

- Identify like terms:
- 21 and -134 are constants.

- $4a$ is a variable term.
- Combine constants:
- $21 - 134 = -113$
- Simplified expression:

$$-113 + 4a$$

Example 4: Solving the equation $15 - 10b + 6b = -55$

- Identify like terms:
- $-10b$ and $6b$ are like terms.
- 15 is a constant.
- Combine like terms:
- $-10b + 6b = -4b$
- Rewrite the equation:

$$15 - 4b = -55$$

- Solve for b :
- Subtract 15 from both sides:

$$-4b = -55 - 15$$

$$-4b = -70$$

- Divide both sides by -4 :

$$b = -70 / -4 = 17.5$$

Example 5: Simplifying and solving $-20 = 4c + 30 - 2c$

- Identify like terms:
- $4c$ and $-2c$ are like terms.

- 30 is a constant.
- Combine like terms:
- $4c - 2c = 2c$
- Rewrite the equation:

$$-20 = 2c + 30$$

- Solve for c:
- Subtract 30 from both sides:

$$-20 - 30 = 2c$$

$$-50 = 2c$$

- Divide both sides by 2:

$$c = -50 / 2 = -25$$

Tips for Effectively Collecting Like Terms

1. Always group similar variables and constants

- Use parentheses if necessary to clearly see like terms.

2. Be mindful of signs (+ or -)

- Carefully handle subtraction signs to avoid errors during combination.

3. Write the simplified expression in standard form

- Generally, place variable terms first, followed by constants for clarity.

4. Practice with varied examples

- Work on different types of expressions to strengthen your skills.

5. Use visual aids or algebra tiles

- Physical or visual tools can help in understanding how to combine like terms.

Common Mistakes to Avoid

- Combining unlike terms (e.g., x and x^2) — always check the exponents.
- Ignoring signs, especially with subtraction — double-check your work.
- Misplacing coefficients or variables — ensure you keep the variable attached to its coefficient.
- Forgetting to simplify constants — combine all constants to reduce the expression.

Conclusion: Mastering Like Terms for Algebra Success

Collecting like terms is a foundational skill in algebra that simplifies expressions and facilitates solving equations efficiently. Whether working with simple constants, variables, or more complex expressions, the key steps involve identifying similar terms, combining their coefficients, and rewriting the expression in its simplest form. By practicing with various examples—such as simplifying expressions like $-3x + 5 - 6x$, or solving equations like $15 - 10b + 6b = -55$ —you develop confidence and proficiency.

Remember, the more you practice, the more intuitive collecting like terms becomes. It's an essential tool that underpins many algebraic concepts and problem-solving strategies. Embrace the process, double-check your work, and soon, simplifying even complex algebraic expressions will feel straightforward and manageable.

Frequently Asked Questions

What does it mean to collect like terms in an algebraic expression?

Collecting like terms involves combining terms that have the same variable raised to the same power by adding or subtracting their coefficients, simplifying the expression.

How do you simplify the expression $-3x + 5 - 6x$?

Combine the like terms involving x : $-3x - 6x = -9x$. The simplified expression is $-9x + 5$.

What is the result of simplifying $21 + 4a - 13$?

Combine the constants $21 - 13 = 8$, so the simplified expression is $8 + 4a$.

How do you solve the equation $15 - 10b + 6b = -55$?

Combine like terms: $-10b + 6b = -4b$. Then, $15 - 4b = -55$. Subtract 15 from both sides: $-4b = -70$.

Divide both sides by -4: $b = 17.5$.

What steps are involved in solving the equation $-20 = 4c + 30 - 2c$?

Combine like terms: $4c - 2c = 2c$. The equation becomes $-20 = 2c + 30$. Subtract 30 from both sides:

$-50 = 2c$. Divide both sides by 2: $c = -25$.

Why is it important to collect like terms before solving equations?

Collecting like terms simplifies the equation, making it easier to isolate the variable and find its value accurately.

Can you give an example of collecting like terms in an algebraic expression?

Yes. In the expression $3x + 4 + 2x - 7$, combine the x terms: $3x + 2x = 5x$, and the constants: $4 - 7 = -3$. The simplified expression is $5x - 3$.

What should you do if an equation has multiple variables and like terms?

Identify and combine the like terms for each variable separately, then proceed to solve for the variable of interest step by step.

How can I check my solution after solving an equation involving like terms?

Substitute the found value back into the original equation to verify if both sides are equal, confirming your solution is correct.

Additional Resources

Collect Like Terms/Equations 1. $-3x + 5 - 6x^2$. $21 + 4a - 133$. $21 + 4a - 134$. $15 - 10b + 6b = -55$. $-20 = 4c + 30 - 2c$: A Comprehensive Guide to Collecting Like Terms in Algebraic Equations

When delving into the world of algebra, one of the foundational skills students and educators alike focus on is collecting like terms. This process simplifies complex expressions and equations, making them easier to solve and interpret. Whether you're tackling simple linear equations or more involved algebraic expressions, understanding how to gather similar terms is essential. This guide aims to clarify the concept through examples, detailed steps, and practical tips, focusing on the specific expressions and equations such as " $-3x + 5 - 6x^2$," " $21 + 4a - 133$," " $21 + 4a - 134$," " $15 - 10b + 6b = -55$," and " $-20 = 4c + 30 - 2c$."

What Does "Collect Like Terms" Mean?

In algebra, collecting like terms involves combining terms that have the same variable(s) raised to the same power. This process simplifies an expression or an equation by reducing it to its most manageable form.

Key points:

- Like terms are terms that have identical variable parts.
- Constants are considered like terms among themselves.
- Combining like terms involves adding or subtracting their coefficients while keeping the variable part unchanged.

Example:

In the expression $3x + 4x - 2 + 7$, the like terms are:

- $3x$ and $4x$ (both contain x)
- -2 and 7 (constants)

By collecting like terms:

$$- 3x + 4x = 7x$$

$$- 2 + 7 = 5$$

So, the simplified form becomes:

$$7x + 5$$

Step-by-Step Approach to Collect Like Terms

1. Identify all terms in the expression or equation.
2. Group like terms together.
3. Add or subtract the coefficients of like terms.
4. Rewrite the expression or equation with the combined terms.

Applying the Concept to Sample Expressions and Equations

Let's examine each example provided and see how collecting like terms simplifies or solves them.

Example 1: Simplify $-3x + 5 - 6x^2$

Step 1: Recognize the terms

$$- 3x \text{ (variable term)}$$

- 5 (constant)
- $-6x^2$ (variable term with coefficient -6 and variable x^2 , which is typically interpreted as x squared or as a typo. For clarity, we interpret x^2 as x^2 , an quadratic term, which cannot be combined with x to collect like terms.)

Note: If the expression is intended as $-6x^2$, then the terms involve different powers of x and cannot be combined.

Step 2: Group similar terms

- $-3x$ (linear term)
- $-6x^2$ (quadratic term)
- 5 (constant)

Since x and x^2 are different powers, they are not like terms, so the expression is already simplified.

Result:

$$-6x^2 - 3x + 5$$

Example 2: Simplify " $21 + 4a - 133$ "

Step 1: Recognize terms

- 21 (constant)
- $4a$ (variable term)
- -133 (constant)

Step 2: Group constants and variable terms

- Constants: 21 and -133
- Variable term: $4a$

Step 3: Combine constants

$$21 - 133 = -112$$

Final simplified expression:

$$-112 + 4a$$

Example 3: Simplify $21 + 4a - 134$

This is similar to the previous example.

Step 1: Recognize terms

- 21 (constant)
- $4a$ (variable)
- -134 (constant)

Step 2: Group constants and variable terms

- Constants: 21 and -134
- Variable: $4a$

Step 3: Combine constants

$$21 - 134 = -113$$

Final simplified expression:

$$-113 + 4a$$

Example 4: Solve the equation $15 - 10b + 6b = -55$

Step 1: Recognize the terms

- `15` (constant)
- `-10b` (variable term)
- `6b` (variable term)

Step 2: Combine like terms involving `b`

$$-10b + 6b = -4b$$

So the equation becomes:

$$15 - 4b = -55$$

Step 3: Isolate the variable term

Subtract `15` from both sides:

$$-4b = -55 - 15$$

Calculate:

$$-4b = -70$$

Step 4: Solve for `b`

Divide both sides by `-4`:

$$b = -70 / -4 = 17.5$$

Solution:

$$b = 17.5$$

Example 5: Simplify "-20 = 4c + 30 - 2c"

Step 1: Recognize terms

- `4c` and `-2c` (variable terms)

- Constants: -20 and 30

Step 2: Combine like terms

$$-4c - 2c = 2c$$

$$\text{Constants: } -20 + 30 = 10$$

Rewrite the equation:

$$-20 = 2c + 30$$

Step 3: Isolate the variable

Subtract 30 from both sides:

$$-20 - 30 = 2c$$

Calculate:

$$-50 = 2c$$

Divide both sides by 2 :

$$c = -25$$

Practical Tips for Collecting Like Terms

- Always identify the variable part: Look at the variables and their exponents carefully.
- Constants are always like terms: Combine all constants together.
- Be mindful of signs: Keep track of plus and minus signs when combining coefficients.
- In multi-variable expressions, only combine terms with identical variable parts.
- Use parentheses to clarify terms during intermediate steps, especially when distributing or dealing with negative signs.

Common Mistakes to Avoid

- Combining unlike terms: For example, adding x and x^2 as if they are like terms.
- Ignoring signs: Forgetting to include negative signs when combining coefficients.
- Overlooking coefficients in terms like $-6x^2$, which cannot be combined with $-3x$.
- Assuming variables with different exponents are like terms, which they are not.

Summary

Collecting like terms is a fundamental skill in algebra that simplifies expressions and solves equations efficiently. The process involves identifying similar terms—those with the same variables raised to the same powers—and combining their coefficients. Whether simplifying expressions such as $-3x + 5 - 6x^2$ or solving equations like $15 - 10b + 6b = -55$, mastering this technique streamlines problem-solving and deepens understanding of algebraic concepts.

By practicing these steps:

- Recognize and group similar terms.
- Combine coefficients carefully.
- Simplify and solve systematically.

You build a strong foundation for tackling more complex algebraic problems with confidence and accuracy. Keep practicing with different expressions and equations, and soon collecting like terms will become second nature in your mathematical toolkit.

Collect Like Terms Equations 1 3x 5 6x² 21 4a 133 21 4a 134 15 10b 6b 55 20 4c 30 2c

Collect Like Terms Equations 1 3x 5 6x² 21 4a 133 21 4a 134 15 10b 6b 55 20 4c 30 2c

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