DOINGWHATW RKS

Assignment: Simplifying Expressions

Twin Groves Middle School, Illinois

Topic: National Math Panel: Major Topics of School Algebra

Practice: Topics of Algebra

Middle school teacher Terri Porto uses this lesson plan to ensure that her beginning algebra students know how to simplify expressions by combining like terms, including addressing the parts of expressions. The lesson plan identifies prior knowledge required for the lesson along with key algebra vocabulary. The heart of the lesson is the sample problem set to be demonstrated by the teacher in increasing order of complexity as well as the sets of rules for simplification to be generated by students. Note that the lesson plan includes strategies for students who are experiencing difficulties with the assignment. Also included are the problem worksheet that students complete during class in pairs for guided practice and a set of homework practice problems.

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Lesson Plan: Simplifying Expressions
Objective – Students will simplify expressions by combining like terms.

Procedure –
Opener
Review distributive property
$$3(x + 2)$$
$$–2(x – 4)$$
$$–(5x + 3)$$
$$–(4 – 2x)$$
$$3x (x + 5)$$

Vocabulary
Discuss what an expression is and when we write them.
Discuss parts of expression – coefficient, terms, like terms, constant

Prior Knowledge
Display both a simplified expression and one that is not simplified to see if they can see a difference. Discuss why you want to simplify.

Sample Problems
Go through sample problems, showing on board and then give students one to try on their white board, send students to board in front of room. Problems should build up in difficulty. Discuss proper answer form.
- one like variable
    $$8a + 2a$$
    $$9p – 5p$$
- two different variables
    $$4x + 8y – 6x + 2y$$
- different variables and constants (be sure to include terms with coefficient of 1 and -1 in both the problem and in answers)
    $$8c – 7a + 3 – 2c + 6a$$
- distribute and simplify
    $$5(2x + 6) – 8x$$
- multiple distributive and simplify
    $$6(2x – 3) – 5(3x + 6) + 7x$$
- same base variable, different exponents
    $$8 + 4x + 3x^2 – x + 5x^3 – x^2 + 2x^3 – 1$$
- if time allows application with perimeter
    Find the perimeter of a rectangle with the length of $3x – 5$ and the width of $x + 3$

Helpful hints for struggling students
- use different colors to highlight like terms
- circle or box off like terms

> - use visual representation to demonstrate difference in terms
>   with same base different exponent

Generate set of rules with student:
-       scan problem
         distribute
         combine like terms
-       order answer
               descending powers
               alphabetical
               constant term last

Pass out worksheet to do in pairs.
      Discuss pair answers

Pass out practice worksheet.

<u>Simplifying Expressions – Problem Worksheet</u>

1. $4x + 7x$

2. $9y - 12y$

3. $3x + 7y - x - 4y$

4. $8r - 3q + q - 7r + 5q$

5. $5f - 4 - 3d + 2 - 8f - 6 + d$

6. $-7k + 8m - 2 + 6k + 2 - 6m$

7. $4(3n + 5) - 10n$

8. $k + 2 - 3(6k - 5)$

9. $8(3x + 4) + 5(7x - 8) + 2x$

10. $-2(5x - 4) - 3(2x + 8) - 7x$

11. $5x + 6x^2 + 9x + 7x^3 - 3x^2$

12. $4x(x + 6) + 7x - 3(x - 5) + 6x^2$

**13. $-x + 4x(7 - 3x) + 3x(2x + 4) - (4 - 2x) + 5$

**14. Find the perimeter of a rectangle with the length of $2y - 4$ and the width of $x + 3$.

** challenge problems

<u>Simplifying Expressions – Homework</u>   Name _____

1. $11x + 7x$

2. $15y – 20\ y$

3. $7x + 5y – x – 2y$

4. $9x – 4m + m – 6x + 5m$

5. $8e – 6\ \text{-}2c + 4 – 10e – 5 + c$

6. $–8x + 7m – 5 + 7x + 3 – 3m$

7. $5(2x + 7) – 8x$

8. $n + 4 – 5(3n – 6)$

9. $3(7x + 6) + 4(\ 9x – 3) + 4x$

10. $–3\ (7x – 6) – 5(4x + 7) – 9x$

11. $4x + 7x^2 + 3x + 9x^3 – 4x^2$

12. $5x\ (x + 7) + 8x – 4\ (x – 3) + 5x^2$

13. Write an expression that needs to be simplified and then simplify it.