Unit plan: Algebra 1

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Algebra 1 Unit 4

Appendix

TITLE: UNIT 4	SUBJECT/COURSE: ALGEBRA 1
TOPIC: POLYNOMIALS AND EXPONENTS	GRADES: 8-10
DESIGNERS: RYAN FARNSWORTH	

Desired Results

Established Goals:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.
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Understandings:	**Essential Questions:**
• Evaluate and simplify expressions containing zero and integer exponents • Know the properties of exponents and use them to evaluate and simplify expressions. • Classify polynomials and write them in standard form. • Evaluate polynomial expressions. • Add, subtract, and multiply polynomials. • How to use the FOIL method when multiplying binomials.	• How and why would you apply exponential rules to solve and simplify problems? • What are the different classes of polynomials? • How do you write a polynomial in standard form? • How do you to add, subtract, and multiply polynomials? • What is the FOIL method and when is it applied and how is it done?
Students will know…	***Students will be able to…***
• The properties of exponents. • Classification of polynomials. • Standard form of a polynomial. • Different ways to add subtract and multiply polynomials.	• Use the properties of exponents to evaluate and simplify expressions. • Write a polynomial in standard form. • Simplify and solve different polynomial expressions. • Use the FOIL method to evaluate the product of two binomials.

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Guided practice worksheets depending upon the lesson topic. • Class starters upon the topic of the previous class will be graded as a quiz.	• Students' responses to answers during class discussions • The chapter test covering all the material in the lesson.

Learning Plan

Learning Activities:

- Guided practices for certain topics in this unit.
- Homework problems to aid in understanding main topics.
- Class starters that will be graded as a quiz based upon the information from the previous lesson.
- Power point Jeopardy game as a review for the students to aid in studying for the chapter test.

4-1 Exponents: Integer Exponents

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
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Objectives:

- Evaluate Expressions containing zero and integer exponents.
- Simplify expressions containing zero and integer exponents.

Materials:

Teacher:

- Pen, pencil, scrap paper, and worksheets needed for this lesson (see appendix)

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

1. Start off with the class starters for this lesson. The whole purpose is to have the students come into class and get settled and to get thinking. These problems can be seen in Appendix B.
2. Start with an introduction to exponents, with simple examples (i.e. the perfect squares, $3^2, 4^2$). This introduction should be directed towards how the perfect squares are evaluated (i.e. $3 \bullet 3$, $4 \bullet 4$, ...).
3. Review terms such as **Base** and **Exponents**.
4. Have the students take out their notebooks and take down the following notes:
    a. Zero Exponents
        i. Any nonzero number raised to the zero power is 1
        ii. If $x \neq 0$ then $x^0 = 1$.

iii. Examples: $3^0 = 1$, $123^0 = 1$, $(-16)^0 = 1$, $\left(\frac{3}{7}\right)^0 = 1$

b. Negative Exponents
   i. A nonzero number raised to a negative exponent is equal to 1 divided by that number raised to the opposite (positive) exponent.
   ii. If $x \neq 0$ and n is an integer, then $x^{-n} = \frac{1}{x^n}$
   iii. Examples: $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$, $2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

5. Once the notes are taken, hand out the guided practice for this lesson and work through the worksheet.
6. Answer any questions still remaining.
7. If time is left pose the following question for the students to work on with a partner:
   a. What will happen if you have a fraction raised to a negative power?
      i. Example: $\left(\frac{3}{4}\right)^{-3} = ?$
8. Assign homework, which is the worksheet pertaining to this lesson (see appendix)

Assessment:

Formative: By going through the guided practice, and walking around, a teacher should be able to see the progress the students are making.

Summative: There is no summative assessment for this lesson

Technology Used:

- None

4-2 a. Multiplication Properties of exponents

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Use multiplication properties of exponents to evaluate and simplify expressions.

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

9. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
10. When the class starter is finished, hand out Discovering Exponent Rules Worksheet 1 (see appendix c). Have students work in pairs or small groups on the worksheet. Gather the class back together with 20 minutes left in the class.
11. Have the students take down the following notes:
    a. Simplifying Exponential Expressions
        i. An exponential expression is completely simplified if:
            1. there are no negative exponents
            2. the same base does not appear more than once in a product or quotient.
            3. no powers raised to powers.
            4. no products raised to powers.
            5. no quotients raised to powers
            6. numerical coefficients in a quotient do not have any common factor other than 1.
        ii. Examples of simplified expressions:

1. $\frac{b}{a}$ x^3 z^{12} a^4b^4 $\frac{s^5}{t^5}$ $\frac{10a^2}{4b}$

iii. Non-examples of simplified expressions:

1. $a^{-2}ba$ $x(x^2)$ $(z^3)^4$ $(ab)^4$ $\left(\frac{s}{t}\right)^5$ $\frac{5a^2}{b}$

b. Product of Powers Property
   i. The product of two powers with the same base equals that base raised to the sum of the exponents.
   ii. If a is any nonzero real number and m and n are integers, then $a^m \bullet a^n = a^{m+n}$
   iii. Example:
      1. $6^7 \bullet 6^4 = 6^{11}$

12. Answer any questions with remaining time about the Discovering Exponent Rules Worksheet or the notes.
13. Assign homework for this lesson (see appendix d)

Assessment:

Formative: The formative assessment with this lesson is the class starter is collected and graded. Additionally, while students are working on the Discovering Exponent Rules Worksheet, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used:

- None

4-2 b. Exponents – Multiplication Properties of Exponents

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Use multiplication properties of exponents to evaluate and simplify expressions

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

14. Start class with the class starter for this lesson. This class starter will be collected and graded for a grade.
15. When the class starter is finished, hand out Discovering Exponent Rules Worksheet 2 (see appendix c). Have students work in pairs or small groups on the worksheet. Gather the class back together with 20 minutes left in the class.
16. Have the students take down the following notes:
    a. Power of a Power Property
        i. A power raised to another power equals that base raised to the product of the exponents
        ii. If a is any nonzero real number and m and n are integers, then $(a^m)^n = a^{m \cdot n} = a^{mn}$
        iii. Example:
            1. $(6^7)^4 = 6^{7 \cdot 4} = 6^{28}$
17. Answer any questions with remaining time about the Discovering Exponent Rules Worksheet or the notes.
18. If there is enough time left, pose the following question to students:

a. What would happen if you had a negative number for the value of m or n in the following equation, $\left(a^m\right)^n = ?$

19. Assign homework for this lesson (see appendix d)

Assessment:

Formative: The formative assessment with this lesson is the class starter is collected and graded. Additionally, while students are working on the Discovering Exponent Rules Worksheet, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used:

- None

4-2 c. Multiplication Properties of exponents

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Use multiplication properties of exponents to evaluate and simplify expressions.

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

20. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
21. When the class starter is finished, hand out Discovering Exponent Rules Worksheet 3 (see appendix c). Have students work in pairs or small groups on the worksheet. Gather the class back together with 20 minutes left in the class.
22. Have the students take down the following notes:
    a. Power of a product property
        i. A product raised to a power equals the product of each factor raised to that power.
        ii. If a and b are any nonzero real numbers and n is any integer, then $(ab)^n = a^n b^n$
        iii. Example:
            1. $(2 \bullet 4)^3 = 2^3 \bullet 4^3 = 8 \bullet 64 = 512$
23. Answer any questions with remaining time about the Discovering Exponent Rules Worksheet or the notes.
24. If there is time left over, have the students explore the following problem:

a. What would happen if n was a negative integer in the following equation, $(ab)^n = ?$

25. Assign homework for this lesson (see appendix d)

Assessment:

Formative: The formative assessment with this lesson is the class starter is collected and graded. Additionally, while students are working on the Discovering Exponent Rules Worksheet, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used:

- None

4.3 Division Properties of Exponents

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Use division properties of exponents to evaluate and simplify expressions

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

26. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
27. Once everyone is done put up an overhead containing the following information as a review:
    a. If $x \neq 0$ then $x^0 = 1$.
    b. If $x \neq 0$ and n is an integer, then $x^{-n} = \frac{1}{x^n}$
    c. If a is any nonzero real number and m and n are integers, then $a^m \bullet a^n = a^{m+n}$
    d. If a is any nonzero real number and m and n are integers, then $(a^m)^n = a^{m \bullet n} = a^{mn}$
    e. If a and b are any nonzero real numbers and n is any integer, then $(ab)^n = a^n b^n$
28. Pose the following question to the class and have them work in pairs or small groups to come up with a solution:

a. Evaluate the following: $5^2 =$
$5^4 =$

b. Once you have a value for both of the above, what is $\frac{5^4}{5^2} =$

c. Recalling what we know about bases and exponents is their some sort of formula you can write that would work for solving the above equation?

d. Once the group has come up with a formula try it out on the following to see if it works: $\frac{3^5}{3^3}$ and $\frac{4^6}{4^2}$.

e. Be ready to present your findings to the class.

29. Have each group go up to the blackboard and write down their formula they found. If they could not come up with one it is not a problem, just pay attention to what is being presented.
30. After going over the material found by the students have the students take out their notebooks and take down the following notes:
    a. Quotient of Powers Property
        i. The quotient of two nonzero powers with the same base equals the base raised to the difference of the exponents.
        ii. If a is a nonzero real number and m and n are integers, then $\frac{a^m}{a^n} = a^{m-n}$.
        iii. Example: $\frac{5^4}{5^2} = 5^{4-2} = 5^2 = 25$
    b. Positive Power of a Quotient Property
        i. A quotient raised to a positive power equals the quotient of each base raised to that power.
        ii. If a and b are nonzero real numbers and n is a positive integer then $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
        iii. Example: $\left(\frac{3}{5}\right)^4 = \frac{3}{5} \bullet \frac{3}{5} \bullet \frac{3}{5} \bullet \frac{3}{5} = \frac{3 \bullet 3 \bullet 3 \bullet 3}{5 \bullet 5 \bullet 5 \bullet 5} = \frac{3^4}{5^4}$
    c. Negative Power of a Quotient Property
        i. A quotient raised to a negative power equals the reciprocal of the quotient raised to the opposite (positive) power.
        ii. If a and b are nonzero real numbers and n is a positive integer, then $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n = \frac{b^n}{a^n}$
        iii. Example: $\left(\frac{2}{3}\right)^{-4} = \left(\frac{3}{2}\right)^4 = \frac{3^4}{2^4}$
31. With any remaining time in class, answer any remaining questions.
32. Assign homework for this lesson (see appendix d). Remind students that there will be a quiz on exponent properties next class.

Assessment:

Formative: The formative assessment with this lesson is the class starter is collected and graded. Additionally, while students are working in pairs, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used:

- Overhead Projector

4.4 Exponents Quiz and Polynomials

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will demonstrate their knowledge on the properties of exponents.
- Students will be able to classify polynomials in standard form.
- Students will be able to evaluate polynomial expressions.

Materials:

Teacher:

- Pen, pencil, worksheets, quiz, whiteboard marker or chalk, overhead projector and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

33. Start off class with a class starter. This class starter will not be collected, however, it is meant to help the students review for the quiz on properties of exponents.
34. Hand out Properties of Exponents Quiz which can be found in the appendix.
35. While students are working on their quiz, have the following notes up on the overhead projector. This is so when students are finished their quiz, they can quietly take notes. When everyone is done with the quiz, make sure all aspects of the notes are discussed.
    a. Polynomials
        i. Monomials

1. Definition: A monomial is a number, a variable, or a product of numbers and variables with whole number exponents.
2. Examples: $5 \quad x \quad -7xy \quad 0.5x^4$
3. Not Examples: $-0.3x^{-2} \quad 4x-y \quad \frac{2}{x^3}$

ii. Polynomials
1. Definition: A polynomial is a monomial or a sum or difference of monomials.
   a. Examples: $5x-6 \quad x^3y^2+x^2y^3-x^4+2$

iii. Degree of Monomials and Polynomials
1. Definition: The degree of a monomial is the sum of the exponents of the variables. A constant has degree 0.
   a. Examples:
      i. $-2a^2b^4=6$
      ii. $4=0$
      iii. $8y=1$
2. Definition: The degree of a polynomial is the degree of the term with the greatest degree.
   a. Examples:
      i. $4x-18x^5=5$
      ii. $0.5x^2y+0.25xy+0.75=3$
      iii. $6x^4+9x^2-x+3=4$

iv. Standard Form of Polynomials
1. Definition: The standard form of a polynomial that contains one variable written with the terms in order from greatest degree to least degree.
   a. Examples:
      i. $20x-4x^3+2-x^2=-4x^3-x^2+20x+2$
      ii. $y^3+y^5+4y=y^5+y^3+4y$

v. Classifying Polynomials

Degree	Name
0	Constant
1	Linear
2	Quadratic
3	Cubic
4	Quartic
5	Quintic
6 or more	6^{th} degree, 7^{th} degree, and so on

Terms	Name
1	Monomial
2	Binomial
3	Trinomial
4 or more	Polynomial

vi. Assign homework for this lesson and answer any questions remaining about the notes covered.

Assessment:

Formative: The formative assessment with this lesson is the class starter. Even though it is not collected and graded, a teacher is able to see how their students do on the material. Additionally, while students are working on the examples in the notes, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: The summative assessment for the exponent lessons is a quiz on all of the properties of exponents.

Technology Used:

- Overhead Projector

4.5 Adding and Subtracting Polynomials

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will be able to add and subtract polynomials

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

36. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
37. Once everyone is done with the class starter start off with introducing adding and subtracting polynomials by putting the following notes on the board:
    a. Adding and Subtracting Polynomials
        i. Tips for success:
            1. Identify like terms
            2. If subtracting, make sure to rewrite subtraction as addition of the opposite
            3. Rearrange terms so that like terms are together
            4. Combine like terms
            5. Simplify
        ii. Polynomials can be added or subtracted in either vertical or horizontal form.
            1. Horizontal Form

a. In horizontal form, use the Associative and Commutative Properties to regroup and combine like terms. (Note: if there is no value for a particular term use 0 as a place holder. Example: $x^2+1=x^2+0x+1$)

b. Addition:

i. $(5x^2+4x+1)+(2x^2+5x+1)=$

$(5x^2+2x^2)+(4x+5x)+(1+1)=$

$7x^2+9x+2$

c. Subtraction:

i. $(5x^2+4x+1)-(2x^2+5x+1)=$

$(5x^2+4x+1)+(-2x^2-5x-1)=$

$(5x^2-2x^2)+(4x-5x)+(1-1)=$

$3x^2-x$

2. Vertical Form

a. In vertical form it is important to align like terms

b. Adding:

i.
$$\begin{array}{r} 5x^2+4x+1 \\ +\,2x^2+5x+1 \\ \hline 7x^2+9x+2 \end{array}$$

c. Subtraction:

i.
$$\begin{array}{r} 5x^2+4x+1 \\ +\,-2x^2-5x-1 \\ \hline 3x^2-x \end{array}$$

38. Once the notes are taken and questions are answered, have the students work on the guided practice that goes along with this lesson which can be found in the appendix. If the students finish this worksheet, have the students work on the homework assignment for this lesson.
39. Assign the homework.

Assessment:

Formative: The formative assessment with this lesson is the class starter is collected and graded. Additionally, while students are working in pairs, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used: None

4.6 Multiplying Polynomials

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will be able to multiply polynomials using the Distributive properties and the FOIL method.

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, overhead and overhead markers, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

40. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
41. Once everyone is done, start a class discussion about multiplication.
    a. Start with reviewing the distributive property by having the students solve the following problem:
        i. $x(x+3)$
    b. By doing this the students should come up with (x^2+3x)
    c. After this have the students try to solve $(x+3)(x+2)$
        i. Have students call out their answers and write them down on the board.
        ii. Then work through the problem by just using the distributive property:

iii. $(x+3)(x+2) =$

$x(x+2)+3(x+2) =$

$x^2+2x+3x+6 =$

x^2+5x+6

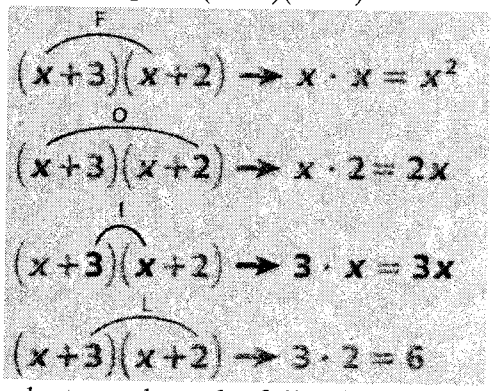
d. Have the students work on the next three problems in their notes:
   i. $(5x+3)(2x^2+10x-6)$
   ii. $(x-2)(5x^2-3x+4)$
   iii. $(x-2)(5x+3)$
e. Once this is done have three students go to the board to show the steps in which the solved the problems.
f. Once students have solved the problems successfully, show them that there is an easy way to organize the multiplication with the table method:
   i.

	$2x^2$	$+10x$	-6
$5x$	$10x^3$	$50x^2$	$-30x$
$+3$	$6x^2$	$30x$	-18

   ii. Once the table is constructed all the students have to do is combine like terms:
   iii. $10x^3+6x^2+50x^2+30x-30x-18$

$10x^3+56x^2-18$

g. Now have students take notes on the FOIL method:
   i. When multiplying two Binomials together, you can use the FOIL method:
      1. Multiply the First terms
      2. Multiply the Outer terms
      3. Multiply the Inner terms
      4. Multiply the Last terms
         a. Example: $(x+3)(x+2)$



   ii. Have the students work on the following examples in their notebook:
   iii. $(x+2)(x-5)$ $\quad (3a^2-b)(a+3b^3)$ $\quad (x+5)^2$
h. Once this is done have three students go to the board to show the steps in which the solved the problems.

i. Once students have solved the problems successfully assign the homework that goes along with this lesson.

Assessment:

Formative: The formative assessment with this lesson is the class starter which is collected and graded. Additionally, while students are working on the problems in the notes, the teacher should be able to see where the students are and if they are having any sort of trouble.

Summative: There is no summative assessment.

Technology Used:

- Overhead projector

4.7 Exponents and Polynomial Review

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will be able to use and apply properties of exponents to simplify and solve equations.
- Students will be able to classify a polynomial, find the degree of the polynomial, and add, subtract and multiply polynomials.

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

42. Start class with the class starter for this lesson. This class starter will be collected and graded for grade.
43. Once everyone is done hand out the Unit Review Packet which can be found in the appendix.
44. Tell the students that this packet is to be done in class and any questions that they may have regarding it will be answered by the teacher during class.
45. Let the students work in pairs or alone on the packet quietly.
46. Remind students that the test is in two classes and next class will be a review game.
47. The homework assignment is to finish the review packet.

Assessment:

Formative: The formative assessment with this lesson is the class starter which is collected and graded. Additionally, while students are working on the review packet, the teacher should be able to see where a student needs help.

Summative: There is no summative assessment.

Technology Used:

- None

4.8 Exponents and Polynomial Review Game

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will be able to use and apply properties of exponents to simplify and solve equations.
- Students will be able to classify a polynomial, find the degree of the polynomial, and add, subtract and multiply polynomials.

Materials:

Teacher:

- Pen, pencil, worksheets, whiteboard marker or chalk, computer with Microsoft PowerPoint, projector linked to the computer, the Microsoft PowerPoint Review Game and scrap paper.

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

48. Start off the class by reviewing any questions that the students had on the review packet.
49. Load up the PowerPoint Review Game and project it to a white screen so the whole class can see.
50. Divide the class up into multiple teams (teams of two, three, four, and so on depending on the size of your class). It is best to have three to five people on a team.
51. Randomly select one team to pick the first question.
52. From here keep score and follow all the Jeopardy rules.
53. If desired, award bonus points to the winning teams that will go onto the exam (5 for the first place, 4 for second place, 3 for third and so on).
54. Remind students that the exam is next class.

Assessment:

Formative: The formative assessment with this lesson is the review game. From this, the teacher should be able to see if the students need help.

Summative: There is no summative assessment.

Technology Used:

- Computer with Microsoft PowerPoint and a projector

4.9 Unit Test

Standards:

- M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y=7x+2x$).
- M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

Objectives:

- Students will be able to use and apply properties of exponents to simplify and solve equations.
- Students will be able to classify a polynomial, find the degree of the polynomial, and add, subtract and multiply polynomials.

Materials:

Teacher:

- Pens, pencils, tests, and scrap paper

Student:

- Writing implement, and notebook

Procedure (Step-by-Step):

55. Hand out tests. Students will have the entire class period to work on it. If the students finish there tests early allow the students to work on other work quietly.
56. There is no homework for this lesson.

Assessment:

Formative: There is no formative assessment for this lesson.

Summative: The summative assessment for this lesson and this unit is the unit test.

Technology Used:

- None

Appendix A:

Do Nows

(Class Starters)

Name_____Date_____
Class Starter 4-1

Give at least 3 different ways to write each of the following:

1) $3 \bullet 3 \bullet 3$

2) $2 \bullet 2 \bullet 3 \bullet 2$

3) $2^2 \bullet 2^2$

Name_____Date_____
Class Starter 4-2

Simplify:

1) $\frac{2f^0}{7g^{-3}}$

2) $\frac{h^3 4k^{-1}}{2hk^2}$

3) Evaluate the expression for x = 4, y = -2, z = 1:
$z^{-3}y^2x^y$

Name_____Date_____
Class Starter 4-2 b

Simplify:

1) $7^2 \bullet 7^3 \bullet 7^{-3}$

2) $x^7 \bullet x^{-6} \bullet x^{-3}$

3) What is wrong with the following : $x^2 \bullet x^5 = x^{10}$

4) Solve: $a^m \bullet a^n =$

Name_____Date_____
Class Starter 4-2 c

1) Write a few sentences explaining the following relationships: $\left(2^3\right)^4 \bullet \left(2^{-3}\right)^{-2}$ and 2^{18}

Name_____ Date_____
Class Starter 4-3

Simplify:

1) $-\left(2x^3\right)^2$

2) $\left(-2x^3\right)^2$

3) What is wrong with the following, explain:
$\left(4x^{-4}\right)^2 = 16x^{-2}$

Name_____Date_____
Class Starter 4-4

Simplify:

1) $a^m \bullet a^n =$

2) $\left(a^m\right)^n =$

3) $a^{m-n} =$

4) $(ab)^m$

5) $a^0 =$

6) Simplify: $\left(2^2\right)^3 + \left(2^4\right)^{-1} + x^0$

Name_____ Date_____

Class Starter 4-5

Given the polynomial $20x - 4x^3 + 2 - x^2$**:**

1) Write the polynomial above in standard form.

2) What is the degree of the polynomial above?

3) Is the polynomial a:

   a) Linear polynomial

   b) Quadratic polynomial

   c) Quadratic binomial

   d) Cubic polynomial

Name_____Date_____
Class Starter 4-6

Add or subtract the following:

1) $\left(-7h^2-4h+7\right)-\left(3h^2-4h+11\right)$

2) $\left(-3n^4+6n^3+4n^2\right)+\left(8n^4-3n^2+9n\right)$

3) $\left(-3n^4+6n^3+4n^2\right)-\left(8n^4-3n^2+9n\right)$

Name_____Date_____
Class Starter 4-7

Multiply the following polynomials and show ALL of you work:

1) $(7x + 7)(5x - 4)$

2) $(8x^5 + 3x^4 + 2x^3)(5x + 10)(12x^2 + 6x + 6)$

Appendix B:

In Class Practice/ Guided Practice

Name_____Date_____
Guided Practice 4-1

Simplify:

1) 2^{-3}

2) $(-3)^{-4}$

3) $(-3)^{3}$

4) -8^{3}

5) 10^{-2}

6) 4.2^{0}

Evaluate each expression for the given variables:

7) $(2t)^{-4}$, for t = 2

8) b^{2}, for b = -3

9) $(m-4)^{-5}$, for m = -3

10) $2x^{0}y^{2}z^{1}$, for x = 7, y = 3, z = -2

Simplify:

11) $(4m)^{6}$

12) $3k^{-3}$

13) $\frac{7}{r^{-3}}$

14) $\frac{x^{-2}}{4^{-2}}$

Name_____ Date:_____

Discovery Worksheet 4-2 a

STEP 1:

Fill in the following table by following the first example:

$3^2 \bullet 3^3$	$(3 \bullet 3)(3 \bullet 3 \bullet 3)$	3^5
$5^4 \bullet 5^2$		
$4^3 \bullet 4^3$		
$2^3 \bullet 2^2$		
$6^3 \bullet 6^4$		

From the completed table, answer the following questions:

1) Examine your completed table. Look at the two exponents in each factor and the exponent in the final answer. What pattern do you notice?

2) Use your pattern to make a rule: $a^m \bullet a^n = ?$

STEP 2:

Use your rule to write each product below as a single power.

1) $5^3 \bullet 5^5$ 2) $7^2 \bullet 7^2$ 3) $10^8 \bullet 10^4$ 4) $8^7 \bullet 8^3$

Fill in the table below similarly to the one above to explore what happens when you multiply more than two powers that have the same base. Then write whether or not you think your rule still holds true in words to summarize what you find.

$5^3 \bullet 5^5$		
$7^2 \bullet 7^2$		
$10^8 \bullet 10^4$		
$8^7 \bullet 8^3$		

Name_____ Date:_____

Discovery Worksheet 4-2 b.

STEP 1:

Fill in the table by following the first example:

$(2^3)^2$	$(2^3)(2^3)$	$(2 \bullet 2 \bullet 2)(2 \bullet 2 \bullet 2)$	2^6
$(2^2)^3$			
$(4^2)^4$			
$(3^4)^2$			
$(6^3)^4$			

From the completed table, answer the following questions:

1) Examine your completed table. Look at the two exponents in the original expression and the exponent in the final answer. What patter do you notice?

2) Use your pattern to make a rule: $(a^m)^n = ?$

STEP 2:

Use your rule to write each product below as a single power.

1) $(5^3)^2$ 2) $(7^2)^2$ 3) $(3^3)^4$ 4) $(9^7)^3$

What do you think will happen when you raise a power to two powers, for example, $\left[(4^2)^3\right]^3$? Write whether or not your rule holds by what you have seen in steps 1 and 2.

Name_____ Date:_____

Discovery Worksheet 4-2 c.

STEP 1:

Fill in the table by following the first example:

$(ab)^3$	(ab) (ab) (ab)	$(a \bullet a \bullet a)(b \bullet b \bullet b)$	$a^{\square}b^{\square}$
$(mn)^4$			
$(xy)^2$			
$(cd)^5$			
$(pq)^6$			

From the completed table, answer the following questions:

3) Examine your completed table. Look at the two exponents in each factor and the exponent in the final answer. What pattern do you notice?

4) Use your pattern to make a rule: $(ab)^m = a^{\square}b^{\square}$

Use your rule to write each power below as a product.

1) $(rs)^8$ 2) $(yz)^9$ 3) $(ab)^7$ 4) $(xz)^{12}$

Look at the first row of your table. What property or properties allow you to write (ab) (ab) (ab) as $(a \bullet a \bullet a)(b \bullet b \bullet b)$?

What do you think will happen when you raise a product containing more than two factors to a power, for example, $(xyz)^7$? Write a rule in words to summarize what you find.

Name_____ Date_____

Guided Practice 4-5

Add or subtract the following:

1) $7a^2 - 10a^2 + 9a$

2) $-8m + 5 - 16 + 11m$

3) $(5n^3 + 3n + 6) + (10n^3 + 9)$

4) $(-3x + 12) + (9x^2 + 2x - 18)$

5) $(5r + 5) - (5r - 6)$

6) $3.7x^2 - 8x + 3.7 - (4.3x^2 - 2.9x + 1.6)$

7) $(6c^4 + 8c + 6) - (2c^4)$

8) $9x^4 + x^3 + 2x + 7 + 2x^4 - 6x^3 - 8x^2 + x$

Name_____ Date_____
Unit Review Packet

Simplify:

1) $\frac{2f^0}{7g^{-3}}$

2) $\frac{a^{-7}b^2}{c^3d^{-4}}$

3) $\frac{h^3k^{-1}}{hk^2}$

4) $a^5 \bullet a^6 \bullet a^{-5}$

5) $z^7 \bullet z^{-6} \bullet y^{-3}$

6) $a^4 \bullet b^5 \bullet c^2 \bullet a^3 \bullet c^1$

7) $(5)^{-3} \bullet (5^2)^2$

8) $(a^{-3})^4 \bullet (a^7)^2$

9) $x^{-2} \bullet (x^{-2})^{-3}$

10) $(a^3b^6)^{-3}$

11) $(2m)^2 \bullet (4m)^2$

12) $\frac{b^5(2r)^{-2}}{b^{-3}r^2}$

Find the degree of the following polynomials:

13) $8y$

14) $4x - 18x^5$

15) $6x^4 + 9x^3 - x^5 + 3x^6 + 5$

Write the following polynomials in standard form:

16) $20x - 4x^3 + 2 - x^2$

17) $y^3 + y^5 + 4y + 3$

Add or subtract the following:

18) $(2t-7)+(-t+2)$

19) $(-7h^2-4h+7)-(7h^2-4h+11)$

Multiply the following polynomials:

20) $(9x + 9)(3x + 3)$

21) $(-5x + 4)(6x^2)$

22) $(6x + 7)^2$

23) $(10x^5 + 3)(-2x^2 - 11x + 2)$

24) $(8x^5 + 3x^4 + 2x^3)(5x + 10)(12x^2 + 6x + 6)$

Explain what is wrong with the following:

25) $x^2 \bullet x^4 = x^8$

26) $(4x^{-3})^2 = 16x^6$

Match the polynomial on the left with its classification on the right:

27) $2x^3 + 6$

28) $-5x + 3$

29) $3x^2 - 2x + 7$

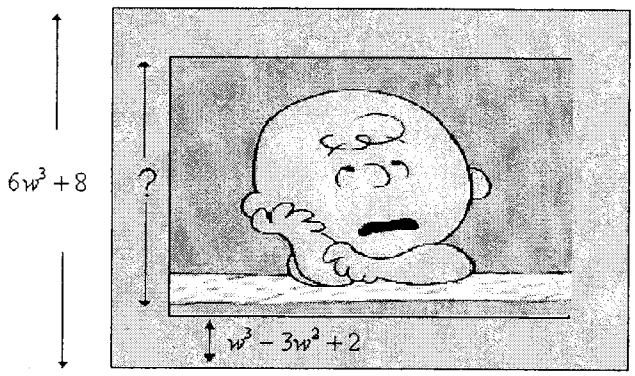
a) Quadratic Polynomial

b) Cubic Trinomial

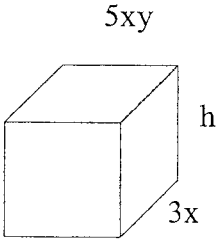
c) Cubic Binomial

d) Linear Polynomial

30) The measurements of photo and its frame are shown below. Write a polynomial that represents the height of the photo.



31) The volume of the prism below is $v = 30x^4y^3$. Write and simplify an expression for the prism's height in terms of x and y. (note: the volume formula for a prism is $v = lwh$, where l is the length, w is the width, and h is the height.)



Appendix C:

Out of Class Practice/ Homework

Name_____ Date_____

Homework 4-1

Simplify:

1) k^{-4}

2) $2z^{-8}$

3) $\frac{1}{2b^{-3}}$

4) $c^{-2}d$

5) $\frac{r^{-5}}{s^{-1}}$

6) $\frac{2f^{0}}{7g^{-3}}$

7) $\frac{a^{-7}b^{2}}{c^{3}d^{-4}}$

8) $\frac{h^{3}k^{-1}}{hk^{2}}$

Evaluate each expression for x = 3, y = -1, z = 2:

9) z^{-3}

10) $(x+y)^{3}$

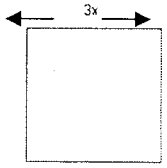
11) $(yz)^{-x}$

12) x^{-y}

13) $(xyz)^{0}$

15) What is the formula for the area of a rectangle?

16) The formula for the area of a square is the same as the area of a rectangle. From the picture, write the are of the square with the dimension given.



Name_____Date_____
Homework 4-2 a

Simplify:

1) $2^5 \bullet 2^6$

2) $4^3 \bullet 3^{-2} \bullet 4^5 \bullet 3^{-6}$

3) $a^4 \bullet b^5 \bullet c^2 \bullet a^3 \bullet c^1$

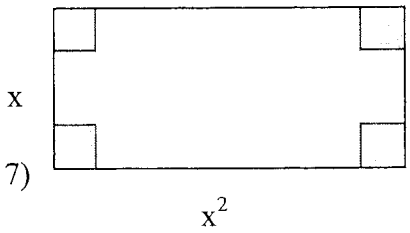
4) $3^2 \bullet 2^3 \bullet 3^2$

5) $a^5 \bullet a^6 \bullet a^{-5}$

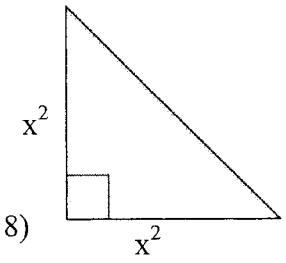
6) $z^7 \bullet z^{-6} \bullet y^{-3}$

Write the expression for the area of each figure:

7)



8)



Explain what is wrong with the following:

9) $x^2 \bullet x^4 = x^8$

10) $x^{-3} \bullet x^4 \bullet x^0 = x^x$

Name_____ Date_____

Homework 4-2 b

Simplify:

1) $(7^4)^2$

2) $(3^6)^0$

3) $(x^2)^{-4}$

4) $(5)^{-3} \bullet (5^2)^2$

5) $(a^{-3})^4 \bullet (a^7)^2$

6) $x^{-2} \bullet (x^{-2})^{-3}$

Evaluate the following expression for x = 2, y = -1, z = -2:

7) $(x^2)^z + x^2 + x^y$

8) $y(x^z)^y$

9) $(xyz)^{xyz}$

10) Write a few sentences explaining the following relationships: $(2^3)^4 \bullet (2^{-3})^{-2}$ and 2^{18}

Name_____ Date_____

Homework 4-2 c

Simplify:

1) $(3t)^4$

2) $(7ab^2)^2$

3) $x \bullet (x^{-3})^{-2}$

4) $(r^2 s)^{-2}$

5) $-(2x^3)^2$

6) $(-2x^3)^2$

7) $(a^3 b^6)^{-3}$

8) $(2m)^2 \bullet (4m)^2$

9) $\dfrac{b^5(2r)^{-2}}{b^{-3}r^2}$

What is wrong with the following, explain:

10) $-(5x^2)^2 = 25x^4$

11) $(4x^{-3})^2 = 16x^6$

Name_____ Date_____

Homework 4-3

Simplify:

1) $\frac{3^6}{3^2}$

2) $\frac{x^5}{x^5}$

3) $\frac{a^5b^3}{(ab)^4}$

4) $\left(\frac{ab^4}{c^3d^3}\right)^{-5}$

5) $\left(\frac{a^{-2}b^3}{c^0a^3}\right)^3$

6) $\left(\frac{2}{5}\right)^{-3}$

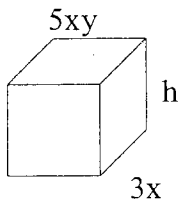
7) $\left(\frac{x^3}{y^2}\right)^{-4}$

8) $\left(\frac{-p^4}{-5p^3}\right)^{-2}$

9) $\left(\frac{a^{-2}b^{-3}}{(c^2)^3a^2}\right)^{-2}$

10) Explain how to simplify $\frac{4^5}{4^2}$. How is this different from $\frac{4^4}{4^5}$?

11) The volume of the prism below is $v = 30x^4y^3$. Write and simplify an expression for the prism's height in terms of x and y. (note: the volume formula for a prism is $v = lwh$, where l is the length, w is the width, and h is the height.)



Name_____ Date_____
Homework 4-4

Find the degree of the following monomial or polynomial:

1) $-2a^2b^4$

2) 4

3) $8y$

4) $4x-18x^5$

5) $6x^4+9x^3-x^5+3x^6+5$

Write the following polynomials in standard form:

6) $20x-4x^3+2-x^2$

7) y^3+y^5+4y+3

Match the polynomial on the left with its classification on the right:

8) $2x^3+6$

9) $-5x+3$

10) $3x^2-2x+7$

a) Quadratic Polynomial

b) Cubic Trinomial

c) Cubic Binomial

e) Linear Polynomial

11) Write a quadratic trinomial of your choice:

12) Write a cubic binomial of your choice:

Name_____ Date_____

Homework 4-5

Add or subtract the following:

1) $(2t-7)+(-t+2)$

2) $(-7h^2-4h+7)-(7h^2-4h+11)$

3) $(4n-2)-2n$

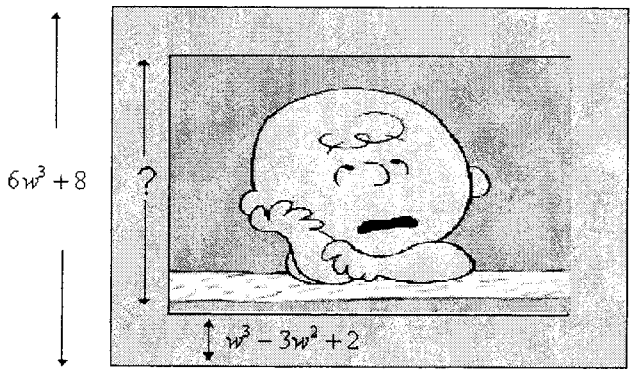
4) $(-x+7)-(-2x)$

5) One or both of the following solutions to $(-3n^4+6n^3+4n^2)+(8n^4-3n^2+9n)$ is incorrect. Tell if one or both are incorrect and why.

$$\begin{array}{r} -3n^4+6n^3+4n^2+0n \\ +\ 8n^4+0n^3-3n^2+9n \\ \hline 5n^4+6\ +\ n^2+\ 9n \end{array}$$

$$\begin{array}{r} -3n^4+6n^3+4n^2 \\ +\ 8n^4-3n^2+9n \\ \hline 5n^4+3n^3+13n^2 \end{array}$$

6) The measurements of photo and its frame are shown below. Write a polynomial that represents the height of the photo.



Name_____Date_____
Homework 4-6

Multiply the following polynomials:

1) $(12x)(12x + 11)$

2) $-9x(-3x^2 + 9x + 11)$

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

4) $(7x + 7)(5x - 4)$

5) $(9x + 9)(3x + 3)$

6) $(10x - 11)(-14x + 9)$

7) $(6x + 7)^2$

8) $9 \bullet (8x^2 - 2x + 3)$

9) $(10x^5 + 3)(-2x^2 - 11x + 2)$

10) $(8x^5 + 3x^4 + 2x^3)(5x + 10)(12x^2 + 6x + 6)$

Appendix D:

Assessments

Name_____ Date_____

Quiz: Properties of Exponents

Simplify:

1) k^{-4}

2) $\frac{4}{2b^3}$

3) $\frac{r^{-5}}{s^{-1}}$

4) $\left(3^2\right)^0 \bullet \left(3^0\right)^3$

5) $x^{-2} \bullet \left(x^{-2}\right)^{-3}$

6) $\left(a^3b^6\right)^{-2}$

7) $\left(-2x^3\right)^2$

8) $\left(7ab^2\right)^{-2}$

9) $\left(\frac{x^3}{y^2}\right)^{-4}$

10) $\left(\frac{ab^2}{b^{-2}}\right)^{-2}$

11) $\left(\frac{a^2a^{-2}}{b^{-3}b^3}\right)^0$

Name_____ Date_____

Chapter Test

Use the distributive property to simplify the following expressions.

1) $3(x+4)$

2) $2(2x-4y)$

3) $-4(x-2)$

4) $6x(2x-4y)$

Factor the following polynomials into the product of a monomial and a binomial.

5) $7x+21$

6) $-3x-12$

7) $2x^2+4x$

8) $6x^2y-12xy^2$

Simplify the following by performing the addition, subtraction, or multiplication

9) $(2x^3 - 4x + x^2) + (3x - x^2) + (6x^3 - 2x^2 - 7x + 3) =$

10) $(3x + 1)(8x - 5)$

11) $(7x - 6)(2x - 9)$

12) $(x^2 + x + 1)(3x - 2)$

13) Write the polynomial so that the powers of x are in descending order of exponents.
$3x^8 + 3x^5 + 6x^3 + 6$

a. $3x^5 + 6 + 3x^8 + 6x^3$

b. $6 + 3x^8 + 6x^3 + 3x^5$

c. $6x^3 + 3x^5 + 6 + 3x^8$

d. $3x^8 + 3x^5 + 6x^3 + 6$

14) Find the degree of $w^5 + w^8x^3y^6 - y^7$.

a. 7

b. 8

c. 12

d. 10

15) What is the simplest form of $(3y - 4)(2y^2 + y - 1)$?

a. $6y^3 - 5y^2 - 7y - 4$

b. $6y^3 - 5y^2 - 7y + 4$

c. $6y^3 - 7y^2 - 7y + 4$

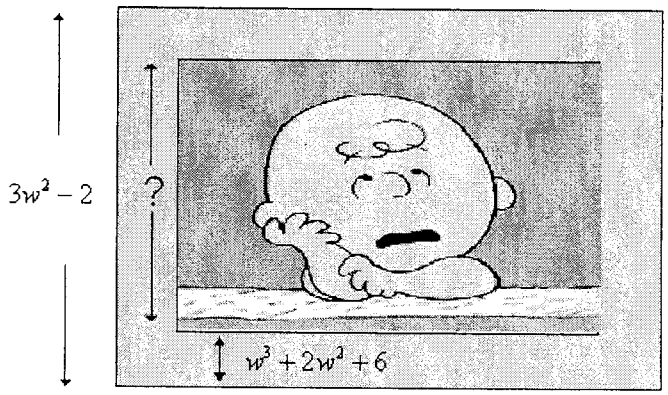
d. $6y^3 - 5y^2 + 7y + 4$

16) Simplify the following expression: $(x^2x^4)^2$

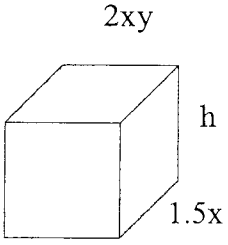
21) The Johnson family wants to cover their backyard with new grass. Their backyard is rectangular, with a length of $3x - 2$ feet and a width of $3x + 1$ feet. However, their rectangular swimming pool, along with its surrounding patio, has dimensions of $x + 4$ by $x + 5$ feet. What is the area of the region of the yard that they want to cover with new grass?

22) Simplify $(9k^3 - 5k^2 + 4) - (-2k^3 + 2k^2 + 8)$. Write the answer in standard form.

23) The measurements of photo and its frame are shown below. Write a polynomial that represents the height of the photo.



24) The volume of the prism below is $v = 30x^4y^3$. Write and simplify an expression for the prism's height in terms of x and y. (note: the volume formula for a prism is $v = lwh$, where l is the length, w is the width, and h is the height.)



Appendix F: Enrichment/ Game

** The Power Point Game is Saved on a disk on my computer. For a copy of the game please e-mail Ryan Farnsworth at rfarnsworth@ksc.mailcruiser.com.

Appendix F:

Works Cited

Works Cited

Burger, Edward B., David J. Chard, Earlene J. Hall, Paul A. Kennedy, Steven J. Leinwand, Freddie L. Renfro, Dale G. Seymour, and Bert K. Waits. Algebra 1. New York, NY: Holt McDougal, a division of Houghton Mifflin Harcourt, 2007. This source was used for the definitions that were used in this unit. Additionally, it aided with the overall organization of the chapters. Some of the worksheets created in this unit were adaptations from this book.