Algebra I CH.8 REVIEW

Name:_____

Date:_____ Period:____

Show ALL work to receive full credit.

Simplify each expression.

1. $(-8.6)^0$

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

3. $7a^{-5}b^3$

4. $\frac{12}{c^{-8}d^2}$

5) $12^{-3} \cdot 12^{10} \cdot 12^0$

6. $a^5 \cdot 3b^9 \cdot 6a$

7. $(t^{-2})^6$

8. $(x^9)^0(x^7)^2$

9. $(5k^2)^3$

10. $(-5g^5h^6)^2(g^4h^2)^4$

11. $\frac{3^7}{3^5}$

12. $\frac{x^5}{x^9}$

13. $\dfrac{m^{-6}n^{-3}}{m^{-13}n^{-1}}$

14. $\left(\dfrac{(-1)^5}{(-2)^{-3}}\right)^2$

15. $(3m^{-1}n^4)^{-2}(2m^3n^{-5})^4$

16. Evaluate $9x^2y^{-2}$ for $x = -3$ and $y = 2$.

Write the number in scientific notation.

17. 8,670,000,000

18. 0.0805

Write the number in standard notation.

19. 9×10^4

20. 9.07×10^{-2}

Simplify the expression. Write the answer using scientific notation.

21. $\left(9 \times 10^7\right)\left(7 \times 10^9\right)$

22. $(4 \times 10^8)^{-2}$

Lesson Practice

Choose the correct answer.

1. Which shows 5^4 in standard form?

   A. 20
   B. 625
   C. 1,024
   D. 3,125

2. Which is $6^3 \times 6^4$ in exponential form?

   A. 36^{12}
   B. 7^6
   C. 6^{12}
   D. 6^7

3. Which shows 9^{-3} in standard form?

   A. 729
   B. 27
   C. $\frac{1}{27}$
   D. $\frac{1}{729}$

4. Which shows $(11^6)^2$ in exponential form?

   A. 22^6
   B. 11^{12}
   C. 11^8
   D. 11^4

5. Which shows $4^6 \div 4^5$ in standard form?

   A. 0
   B. 1
   C. 4
   D. 16

6. Which shows $2^{-2} \times 2^6$ in exponential form?

   A. 2^4
   B. 2^{-4}
   C. 2^{-8}
   D. 2^{-12}

7. Which shows $(2^2)^{-2}$ in standard form?

A. 0

B. $\frac{1}{16}$

C. $\frac{1}{8}$

D. 1

8. Which shows $6^{-1} \div 6^{-4}$ in exponential form?

A. 6^{-5}

B. 6^{-3}

C. 6^{1}

D. 6^{3}

9. Look at the expression below.

$a^6 \div a^4$

A. Simplify the expression. Show your work.

B. Which property of powers did you use to answer Part A?

Lesson Practice

Choose the correct answer.

1. What is 0.000058 written in scientific notation?

   A. 5.8×10^{-6}
   B. 5.8×10^{-5}
   C. 5.8×10^{5}
   D. 5.8×10^{6}

2. The length of the Amazon River in South America is 6,400 kilometers. What is this length written in scientific notation?

   A. 6.4×10^{2} km
   B. 6.4×10^{3} km
   C. 6.4×10^{4} km
   D. 6.4×10^{5} km

3. What is 6.92×10^{-3} written in standard form?

   A. 0.000692
   B. 0.00692
   C. 0.0692
   D. 0.692

4. The area of Australia is approximately 7,700,000 square kilometers. What is this area written in scientific notation?

   A. 7.7×10^{-6} sq km
   B. 7.7×10^{-5} sq km
   C. 7.7×10^{5} sq km
   D. 7.7×10^{6} sq km

5. What is 4.01×10^{0} written in standard form?

   A. 0.401
   B. 4.001
   C. 4.01
   D. 40.1

6. A virus is viewed under a microscope. Its diameter is 0.0000002 meter. How would this length be expressed in scientific notation?

   A. 2×10^{-7} meter
   B. 2×10^{-6} meter
   C. 2×10^{6} meters
   D. 2×10^{7} meters

7. Find the product.

$(1.9 \times 10^3)(4.5 \times 10^2)$

A. 8.55×10^1

B. 8.55×10^3

C. 8.55×10^5

D. 8.55×10^6

8. Find the quotient.

$$\frac{2.89 \times 10^2}{3.4 \times 10^{-2}}$$

A. 0.85×10^0

B. 0.85×10^4

C. 8.5×10^3

D. 8.5×10^5

9. Mohammed copied this problem into his notebook.

$(3.4 \times 10^5)(3.8 \times 10^{-9})$

A. Use the associative and commutative properties to rearrange the factors.

B. Find the product. Write the product in standard form.

What You've Learned

Assessment Framework

In Chapters 1 and 2, you

- **6.11.05:** used variables and applied the Distributive Property to variable expressions.

In Chapter 3, you

- **8.11.16:** combined like terms to solve equations.

In Chapter 8, you

- **8.11.06:** simplified variable expressions with exponents by using the multiplication and division properties of exponents.

Check Your Readiness

GO for Help to the Lesson in green.

Finding Factors of Composite Numbers (Skills Handbook page 770)

List all the factors of each number.

1. 12	**2.** 56	**3.** 31	**4.** 27
5. 110	**6.** 65	**7.** 50	**8.** 200
9. 11	**10.** 42	**11.** 66	**12.** 73

Simplifying Expressions (Lesson 2-4)

Simplify each expression.

13. $2x^2 - x + x^2 - 3x$

14. $-b + 2 + 3b + 4$

15. $-5y - y^2 + 4y^2 - 6y$

16. $(3w - 2w^2 + 4w - 2w^2)\frac{1}{6}$

17. $-8(z + 2) + 5(3z - 10)$

18. $2(x + 4x^2 - 2x - 2x^2)$

19. $12t - 5t^2 - 2t - t^2$

20. $p - 3 - (p^2 - 3) - 3p$

Multiplying Expressions With Exponents (Lessons 8-3 and 8-4)

Simplify each expression.

21. $(7w)^2$	**22.** $(-5n^2)(-5n)$	**23.** $(3z^2)^2$	**24.** $(2t^3)(5t^4)$
25. $(4y^3)^2$	**26.** $(-9ab)^2$	**27.** $4(x^2)^2$	**28.** $(-6p^4)^2$

Dividing Expressions With Exponents (Lesson 8-5)

Simplify each expression.

29. $\frac{x^5y^8}{x^3y^4}$	**30.** $\frac{(3c)^2}{(3c)}$	**31.** $\frac{-5t}{(10t^3)(2t)}$	**32.** $\frac{(3a)(4a^3)}{6a^2}$

Name: _____ **Class:** _____

AU7: Notes# 1 – Adding & Subtracting Polynomials **Date:** _____

Vocabulary:

Monomial: an expression that is a number, a variable, or a product of a number and one or more variables. *Examples:* $4x$, $3xy^3$, 18

Degree of a Monomial: the sum of the exponents of its variables, for a nonzero constant, the degree is zero. Zero has no degree. *Examples:* $4x$ – degree 1; $3xy^3$ – degree 4; 18 – degree 0

Polynomial - an expression consisting of one or more monomial terms, including variables.

Standard Form of a Polynomial: the degrees of its monomial terms decrease from left to right.
Example: $3d^2+8d$ *Example:* $-x^3+4x^2+2$ *Example:* $-8y^2+2xy+x^2$

Degree of a Polynomial: one variable is the same as the degree of the monomial with the greatest exponent.
Example: $3d^2+8d$ - degree 2 *Example:* $-x^3+4x^2+2$ - degree 3
Example: $-8y^2+2xy+x^2$ - degree 2

Binomial: two monomial terms being added or subtracted.

Trinomial: three monomial terms being added or subtracted.

Like terms – monomials that contain the same variables raised to the same powers.

Polynomial	Degree	Name Using Degree	Number of Terms	Name Using Number of Terms
$7x + 4$	1	linear	2	binomial
$3x^2 + 2x + 1$	2	quadratic	3	trinomial
$4x^3$	3	cubic	1	monomial
$9x^4 + 11x$	4	fourth degree	2	binomial
5	0	constant	1	monomial

Example 1:

Using Properties to Simplify Polynomials Use properties of numbers to simplify the polynomial $2b^2 - 2b - 3b^2 + 4 + b - 4$.

$2b^2 - 2b - 3b^2 + 4 + b - 4$

$= 2b^2 - 3b^2 - 2b + b + 4 - 4$ ← [ ] Property.

$= (2b^2 - 3b^2) + (-2b + b) + (4 - 4)$ ← [ ] Property.

$= (2 - 3)b^2 + (-2 + 1)b + (4 - 4)$ ← [ ] Property.

$=$ [ ] ← Simplify.

Try It!

The polynomials below represent the areas of two neighborhoods. Use properties of numbers to simplify each polynomial.

a. $4g^2 - 5g - 2g^2 + 7g$

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

Closure Property: A system is *Closed* under an operation if, the operation of two elements yields an element in the system.

Let's discuss the set of integers:

Ex: -3 + 4 = 1

Show the integers are closed under subtraction and multiplication but not division

The Polynomial system is analogous to the integer number system; it is closed under addition, subtraction and multiplication.

Example 2: Adding Polynomials

Add $(3x^2 - 5x - 1)$ and $(x^2 - 6x + 3)$

Try It! – Add

a. $(x^2 + 4x) + (2x^2 - 6x)$

b. $(3x^2 - x - 1) + (2x^2 + 2x - 1)$

c. $(y^2 - y - 1) + (y^2 + y + 3)$

d. $(2k^2 + 1) + (k^2 - 2k + 5)$

e. The length of a rectangle is $(2x + 5)$ and the width is $(5x - 1)$. Write an expression for the perimeter of the rectangle.

Example 3: Subtracting Polynomials

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

Try It! – Subtract

a. $(2x^2 + 3x) - (x^2 + x)$

b. $(3l^2 - 2l + 1) - (2l^2 + l - 3)$

c. $(x^2 + 1) - (2x^2 + x - 1)$

d. Subtract $(3z^2 + 2z + 1)$ from $(z^2 - 4z)$

e. The perimeter of a triangle is represented by the polynomial $3x^2 - 5x + 2$. Two of the sides of the triangle are represented by the expressions $x^2 + 3x + 5$ and $x^2 - x - 8$. Find an expression for the third side of the triangle.

Name _____ Class _____ Date _____

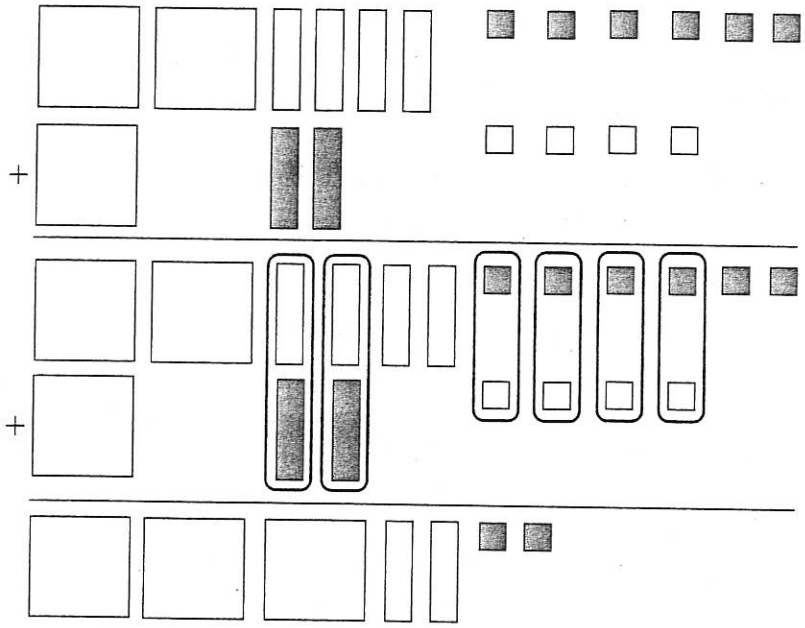
Reteaching 9-1

Adding and Subtracting Polynomials

OBJECTIVE: Adding and subtracting polynomials **MATERIALS:** Tiles

Example

Using tiles, simplify $(2a^2 + 4a - 6) + (a^2 - 2a + 4)$.



← **Use tiles to represent the terms of $2a^2 + 4a - 6$.**

← **Use tiles to represent the terms of $a^2 - 2a + 4$. Align like terms vertically with the tiles in the row above.**

← **Remove zero pairs.**

← **Count the remaining tiles.**

$3a^2 + 2a - 2$ ← **Solution**

Exercises

Use tiles to simplify each sum or difference.

1. $(4x - 5y + 3) + (2x + 7y - 7)$
2. $(3a^2 + 5a - 6) - (2a^2 - 3a - 9)$
3. $(6x^2 - 3x + 2) + (3x^2 + x - 5)$
4. $(4x^2 + 2x - 7) - (-3x^2 - 6x + 2)$
5. $(6z^3 - 5z^2 + 1) + (8z^3 + 7z^2 - 4)$
6. $(4x^2 + 2) - (-2x^2 + 5) + (x^2 + 4)$

Simplify. Write each answer in standard form.

7. $(2x^2 - 3x + 4) + (3x^2 + 2x - 3)$
8. $(7x^3 - 3x + 1) - (x^3 + x^2 - 2)$
9. $(3y^2 - 3y + 2) + (4y^2 + 3y - 1)$
10. $(5x^2 - 10) - (3x^2 + 7)$
11. $(2x^3 + x^2 + 1) + (3x^3 - x^2 + 2)$
12. $(4x^3 + 3x + 2) - (2x^2 - 3x + 7)$
13. $(3x^2 + 7x - 6) + (x^3 + x^2 - x - 1)$
14. $(4x^2 - x + 6) - (3x^2 - 4)$

Name _____ Class _____ Date _____

Practice 9-1

Adding and Subtracting Polynomials

Write each polynomial in standard form. Then name each polynomial based on its degree and number of terms.

1. $4y^3 - 4y^2 + 3 - y$
2. $x^2 + x^4 - 6$
3. $x + 2$
4. $2m^2 - 7m^3 + 3m$
5. $4 - x + 2x^2$
6. $7x^3 + 2x^2$
7. $n^2 - 5n$
8. $6 + 7x^2$
9. $3a^2 + a^3 - 4a + 3$
10. $5 + 3x$
11. $7 - 8a^2 + 6a$
12. $5x + 4 - x^2$
13. $2 + 4x^2 - x^3$
14. $4x^3 - 2x^2$
15. $y^2 - 7 - 3y$
16. $x - 6x^2 - 3$
17. $v^3 - v + 2v^2$
18. $8d + 3d^2$

Simplify. Write each answer in standard form.

19. $(3x^2 - 5x) - (x^2 + 4x + 3)$
20. $(2x^3 - 4x^2 + 3) + (x^3 - 3x^2 + 1)$
21. $(3y^3 - 11y + 3) - (5y^3 + y^2 + 2)$
22. $(3x^2 + 2x^3) - (3x^2 + 7x - 1)$
23. $(2a^3 + 3a^2 + 7a) + (a^3 + a^2 - 2a)$
24. $(8y^3 - y + 7) - (6y^3 + 3y - 3)$
25. $(x^2 - 6) + (5x^2 + x - 3)$
26. $(5n^2 - 7) - (2n^2 + n - 3)$
27. $(5n^3 + 2n^2 + 2) - (n^3 + 3n^2 - 2)$
28. $(3y^2 - 7y + 3) - (5y + 3 - 4y^2)$
29. $(2x^2 + 9x - 17) + (x^2 - 6x - 3)$
30. $(3 - x^3 - 5x^2) + (x + 2x^3 - 3)$
31. $(3x + x^2 - x^3) - (x^3 + 2x^2 + 5x)$
32. $(d^2 + 8 - 5d) - (5d^2 + d - 2d^3 + 3)$
33. $(3x^3 + 7x^2) + (x^2 - 2x^3)$
34. $(6c^2 + 5c - 3) - (3c^2 + 8c)$
35. $(3y^2 - 5y - 7) + (y^2 - 6y + 7)$
36. $(3c^2 - 8c + 4) - (7 + c^2 - 8c)$
37. $(4x^2 + 13x + 9) + (12x^2 + x + 6)$
38. $(2x - 13x^2 + 3) - (2x^2 + 8x)$
39. $(7x - 4x^2 + 11) + (7x^2 + 5)$
40. $(4x + 7x^3 - 9x^2) + (3 - 2x^2 - 5x)$
41. $(y^3 + y^2 - 2) + (y - 6y^2)$
42. $(x^2 - 8x - 3) - (x^3 + 8x^2 - 8)$
43. $(3x^2 - 2x + 9) - (x^2 - x + 7)$
44. $(2x^2 - 6x + 3) - (2x + 4x^2 + 2)$
45. $(2x^2 - 2x^3 - 7) + (9x^2 + 2 + x)$
46. $(3a^2 + a^3 - 1) + (2a^2 + 3a + 1)$
47. $(2x^2 + 3 - x) - (2 + 2x^2 - 5x)$
48. $(n^4 - 2n - 1) + (5n - n^4 + 5)$
49. $(x^3 + 3x) - (x^2 + 6 - 4x)$
50. $(7s^2 + 4s + 2) + (3s + 2 - s^2)$
51. $(6x^2 - 3x + 9) - (x^2 + 3x - 5)$
52. $(3x^3 - x^2 + 4) + (2x^3 - 3x + 9)$
53. $(y^3 + 3y - 1) - (y^3 + 3y + 5)$
54. $(3 + 5x^3 + 2x) - (x + 2x^2 + 4x^3)$
55. $(x^2 + 15x + 13) + (3x^2 - 15x + 7)$
56. $(7 - 8x^2) + (x^3 - x + 5)$
57. $(2x + 3) - (x - 4) + (x + 2)$
58. $(x^2 + 4) - (x - 4) + (x^2 - 2x)$

Name: _____ **Class:** _____

AU7: Notes# 2 – Multiplying and Factoring Polynomials **Date:** _____

Warm-Up:

Use the distributive property to write an equivalent expression

1. $2(x+2)=$

2. $x(x+3)=$

3. $3(2x+1)=$

4. $3n(n+4)=$

Example 1: Multiplying a Monomial and a Polynomial

$4x(x^2+3x-2)=$

Try-It! – Simplify the following:

a. $4b(5b^2+b+6)=$

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

c. $-7h(3h^2-8h-1)=$

d. $-4y^2(5y^4-3y^2+2)=$

Example 2: Factoring Polynomials using G.C.F.
Write an equivalent expression by factoring the G.C.F.:

a. $6x+3=$

b. $3n^2+12n=$

c. $4x^3+12x^2-8x=$

Try-It! – Write an equivalent expression by factoring the G.C.F.:

a. $5x^5+10x^3=$

b. $6m^3-12m^2-24m=$

c. $-21h^3+56h^2+7h=$

d. $10x^2y-15xy^2=$

e. $9m^2-4m+12=$

Example 3: Applications

The length of a rectangle is represented by x, the width is represented by $6x^2 - 4x - 2$, what is the area of the rectangle?

Try-It!

The length of a rectangle is twelve less than three times the width. What is the area of the rectangle written as a polynomial? What are the dimensions of a different rectangle with an equivalent area?

Name _____ Class _____ Date _____

Reteaching 9-2

Multiplying and Factoring

OBJECTIVE: Factoring a monomial from a polynomial

MATERIALS: None

- To factor a polynomial you must find the **G**reatest **C**ommon **F**actor. The **GCF** is the greatest factor that divides evenly into each term.

Example

Factor $18x^3 + 6x^2 - 12x$.

a. First find the GCF.

$18x^3 = (2)\ (3)\ 3\ (x)\ x\ x$ ← **List the factors of each term. Circle the factors common to all terms.**

$6x^2 = (2)\ (3)\ x\ (x)$

$12x = \ (2)\ 2\ (3)\ (x)$

$2 \cdot 3 \cdot x = 6x$ ← **Multiply the circled terms together to get the GCF.**

b. Factor out the GCF from each term.

$\frac{18x^3}{6x} = 3x^2$ ← **Divide each term by the GCF.**

$\frac{6x^2}{6x} = x$

$\frac{-12x}{6x} = -2$

$6x(3x^2 + x - 2)$ ← **Solution**

Exercises

Use the GCF to factor each polynomial.

1. $21x - 14$
2. $5y^3 - 10y^2 + 15y$
3. $x^3 + 3x^2 + x$
4. $3x^2 + 6x^4$
5. $18x^3 - 6x^2 + 24x$
6. $z^3 - 3z^2$
7. $12k^3 + 6k^2 - 18k$
8. $6x^3 - 4x^2 + 8x$
9. $8p^4 + 12p^2 + 4p$
10. $36x^2 - 18x$
11. $6x^2 + 18x$
12. $6x^3 - 2x^2 + 8x$
13. $6x^3 + 6x^2 - 6x$
14. $5x^3 + 5x^2$
15. $3x^2 + 6x + 3$
16. $10x^2 + 35x$
17. $8x^5 + 16x^4 - 8x^3$
18. $9x^3 - 6x^2 - 15x$

Name _____ Class _____ Date _____

Practice 9-2

Multiplying and Factoring

Simplify each product.

1. $4(a - 3)$
2. $-5(x - 2)$
3. $-3x^2(x^2 + 3x)$
4. $4x^3(x - 3)$
5. $-5x^2(x^2 + 2x + 1)$
6. $3x(x^2 - 5x - 3)$
7. $-x^2(-2x^2 + 3x - 2)$
8. $4d^2(d^2 - 3d - 7)$
9. $5m^3(m + 6)$
10. $a^2(2a + 4)$
11. $4(x^2 - 3) + x(x + 1)$
12. $4x(5x - 6)$

Find the GCF of the terms of each polynomial.

13. $8x - 4$
14. $15x + 45x^2$
15. $x^2 + 3x$
16. $4c^3 - 8c^2 + 8$
17. $12x - 36$
18. $12n^3 + 4n^2$
19. $14x^3 + 7x^2$
20. $8x^3 - 12x$
21. $9 - 27x^3$
22. $25x^3 - 15x^2$
23. $11x^2 - 33x$
24. $4n^4 + 6n^3 - 8n^2$
25. $8d^3 + 4d^2 + 12d$
26. $6x^2 + 12x - 21$
27. $8g^2 + 16g - 8$

Factor each polynomial.

28. $8x + 10$
29. $12n^3 - 8n$
30. $14d - 2$
31. $6h^2 - 8h$
32. $3z^4 - 15z^3 - 9z^2$
33. $3y^3 - 8y^2 - 9y$
34. $x^3 - 5x^2$
35. $8x^3 - 12x^2 + 4x$
36. $7x^3 + 21x^4$
37. $6a^3 - 12a^2 + 14a$
38. $6x^4 + 12x^2$
39. $3n^4 - 6n^2 + 9n$
40. $2w^3 + 6w^2 - 4w$
41. $12c^3 - 30c^2$
42. $2x^2 + 8x - 14$
43. $4x^3 + 12x^2 + 16x$
44. $16m^3 - 8m^2 + 12m$
45. $4a^3 - 20a^2 - 8a$
46. $18c^4 - 9c^2 + 7c$
47. $6y^4 + 9y^3 - 27y^2$
48. $6c^2 - 3c$

49. A circular pond will be placed on a square piece of land. The length of a side of the square is $2x$. The radius of the pond is x. The part of the square not covered by the pond will be planted with flowers. What is the area of the region that will be planted with flowers? Write your answer in factored form.

50. A square poster of length $3x$ is to have a square painting centered on it. The length of the painting is $2x$. The area of the poster not covered by the painting will be painted black. What is the area of the poster that will be painted black?

51. The formula for the surface area of a sphere is $A = 4\pi r^2$. A square sticker of side x is placed on a ball of radius $3x$. What is the surface area of the sphere not covered by the sticker? Write your answer in factored form.