Algebra and Trigonometry in-class worksheet, Section R.3

Text excerpt:

> Algebraic expressions like $3ab^3 - 8$ and $5x^4y^2 - 3x^3y^8 + 7xy^2 + 6$ are **polynomials in several variables**. The **degree of a term** is the sum of the exponents of the variables in that term. The **degree of a polynomial** is the degree of the term of highest degree.

Determine the unique terms and their degree for these polynomials

1. $-5y^4 + 3y^3 + 7y^2 - y - 4$

3. $3a^4b - 7a^3b^3 + 5ab - 2$

4. $6p^3q^2 - p^2q^4 - 3pq^2 + 5$

Text excerpt:

If two terms of an expression have the same variables raised to the same powers, they are called **like terms**, or **similar terms**. We can **combine**, or **collect**, **like terms** using the distributive property. For example, $3y^2$ and $5y^2$ are like terms and

$$3y^2 + 5y^2 = (3 + 5)y^2$$
$$= 8y^2.$$

We add or subtract polynomials by combining like terms.

Perform the following polynomial additions

5. $(5x^2y - 2xy^2 + 3xy - 5) +$
$(-2x^2y - 3xy^2 + 4xy + 7)$

6. $(6x^2y - 3xy^2 + 5xy - 3) +$
$(-4x^2y - 4xy^2 + 3xy + 8)$

7. $(2x + 3y + z - 7) + (4x - 2y - z + 8) +$
$(-3x + y - 2z - 4)$

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

11. $(x^4 - 3x^2 + 4x) - (3x^3 + x^2 - 5x + 3)$

Text excerpt:

Multiplication of polynomials is based on the distributive property—for example,

$$(x + 4)(x + 3) = x(x + 3) + 4(x + 3)$$ Using the distributive property

$$= x^2 + 3x + 4x + 12$$ Using the distributive property two more times

$$= x^2 + 7x + 12.$$ Combining like terms

In general, to multiply two polynomials, we multiply each term of one by each term of the other and add the products.

Perform the following polynomial multiplications

13. $(a - b)(2a^3 - ab + 3b^2)$

14. $(n + 1)(n^2 - 6n - 4)$

39. $(2x + 3y + 4)(2x + 3y - 4)$

Text excerpt:

We can find the product of two binomials by multiplying the **F**irst terms, then the **O**uter terms, then the **I**nner terms, then the **L**ast terms. Then we combine like terms, if possible. This procedure is sometimes called **FOIL**.

Special Products of Binomials

$(A + B)^2 = A^2 + 2AB + B^2$	Square of a sum
$(A - B)^2 = A^2 - 2AB + B^2$	Square of a difference
$(A + B)(A - B) = A^2 - B^2$	Product of a sum and a difference

Perform the following (special) polynomial multiplications (ie binomial multiplication)

15. $(x + 5)(x - 3)$

16. $(y - 4)(y + 1)$

17. $(x + 6)(x + 4)$

18. $(n - 5)(n - 8)$

27. $(5x - 3)^2$

28. $(3x - 2)^2$

29. $(2x + 3y)^2$

33. $(a + 3)(a - 3)$

35. $(2x - 5)(2x + 5)$

37. $(3x - 2y)(3x + 2y)$

Rough and Tumble problems:

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

45. $(a^n + b^n)(a^n - b^n)$

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

51. $(x^{a-b})^{a+b}$

53. $(a + b + c)^2$