Name: Date:

WORKSHEET :

Monomials, Binomials & Polynomials

Identify the degree of each polynomial: Degree

1) $x^2 + 3x - 28$

2) $x^4 + 12x^2 + 35$

3) $x^2 - 15x + 56$

4) $x^2 - 8x^5 + 15$

5) $x^3 + 7x - 144$

6) $x^8 - 7x^5 - 144$

7) $x^2 - 2x + 1$

8) $x^2 - y^2$

9) $x^2 - x + y^3 + z^2$

10) $x^2 - y$

WORKSHEET :

Monomials, Binomials & Polynomials

Multiplying Monomials and Polynomials

Simplify each expression.

1) $2z^2(8z^2 + 7z - 6)$

2) $8(2d + 6y)$

3) $9x(4x - 8)$

4) $9d(6d^2 - 4d + 5)$

5) $7s(2s^2 - 6sc + 9c^2)$

6) $9(5q - 8)$

7) $2(9b^2 + 7b + 5)$

8) $2(9n^2 + 5nx - 7x^2)$

9) $9z(7z - 8g)$

10) $9z^3(4z^2 - 6z + 7)$

WORKSHEET :

Monomials, Binomials
& Polynomials

Multiplying Binomials

Simplify each expression.

1) $(q + 3)(q + 5)$

2) $(c - 2)(8c + 6)$

3) $(8b + 4)(b - 9)$

4) $(9s + 5)(4s - 8)$

5) $(n - 3)(n - 2)$

6) $(s - 4)(8s - 5)$

7) $(8c + 4)(c - 9)$

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

9) $(s - 5)(s + 8)$

10) $(h + 6)(7h + 9)$

WORKSHEET :

Monomials, Binomials & Polynomials

Adding and Subtracting Polynomials

Simplify each expression.

1) $(8p^2 - 5p + 7) - (6p^2 - 4 + p^3) - (2p^3 - 9)$

2) $(7r^4 + 6r^2 + 5) - (9r^4 - 3 + 2r)$

3) $(7 - 3s^3) - (5s^3 - 9)$

4) $(6b^4 + 9b^3) + (3b^3 - 5b - 4b^4)$

5) $(9 + 2x^2 - 7x^4) + (6x - 3x^4 - 5)$

6) $(2 + 6x^2) - (7x^3 + 9 - 3x^2) + (5 + 4x)$

7) $(3x^4 + 4) + (8 + 9x^3 - 7x^4)$

8) $(8y^2 - 5y - 4) + (6y - 7) + (9y^4 + 3y^2 - 2y)$

9) $(3 - 2p^3 - 5p^4) + (7p^4 + 6p^2 - 9) + (p^3 + 4p^2 - 8)$

10) $(9 + z^4 + 7z^5) - (3z^5 - 2 + 5z^4) - (8 - 6z + 4z^4)$

ANSWERS :

Monomials, Binomials & Polynomials

Identify the degree of each polynomial:	Degree
1) $x^2 + 3x - 28$	2nd degree
2) $x^4 + 12x^2 + 35$	4th degree
3) $x^2 - 15x + 56$	2nd degree
4) $x^2 - 8x^5 + 15$	5th degree
5) $x^3 + 7x - 144$	3rd degree
6) $x^8 - 7x^5 - 144$	8th degree
7) $x^2 - 2x + 1$	2nd degree
8) $x^2 - y^2$	4th degree
9) $x^2 - x + y^3 + z^2$	7th degree
10) $x^2 - y$	3rd degree

ANSWERS :

Monomials, Binomials
& Polynomials

Multiplying Monomials and Polynomials

Simplify each expression.

1) $2z^2(8z^2 + 7z - 6)$

$16z^4 + 14z^3 - 12z^2$

2) $8(2d + 6y)$

$16d + 48y$

3) $9x(4x - 8)$

$36x^2 - 72x$

4) $9d(6d^2 - 4d + 5)$

$54d^3 - 36d^2 + 45d$

5) $7s(2s^2 - 6sc + 9c^2)$

$14s^3 - 42s^2c + 63c^2s$

6) $9(5q - 8)$

$45q - 72$

7) $2(9b^2 + 7b + 5)$

$18b^2 + 14b + 10$

8) $2(9n^2 + 5nx - 7x^2)$

$18n^2 + 10nx - 14x^2$

9) $9z(7z - 8g)$

$63z^2 - 72zg$

10) $9z^3(4z^2 - 6z + 7)$

$36z^5 - 54z^4 + 63z^3$

ANSWERS :

Monomials, Binomials & Polynomials

Multiplying Binomials

Simplify each expression.

1) $(q + 3)(q + 5)$

$q^2 + 8q + 15$

2) $(c - 2)(8c + 6)$

$8c^2 - 10c - 12$

3) $(8b + 4)(b - 9)$

$8b^2 - 68b - 36$

4) $(9s + 5)(4s - 8)$

$36s^2 - 52s - 40$

5) $(n - 3)(n - 2)$

$n^2 - 5n + 6$

6) $(s - 4)(8s - 5)$

$8s^2 - 37s + 20$

7) $(8c + 4)(c - 9)$

$8c^2 - 68c - 36$

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

$15k^2 - 22k - 48$

9) $(s - 5)(s + 8)$

$s^2 + 3s - 40$

10) $(h + 6)(7h + 9)$

$7h^2 + 51h + 54$

ANSWERS :

Monomials, Binomials
& Polynomials

Adding and Subtracting Polynomials

Simplify each expression.

1) $(8p^2 - 5p + 7) - (6p^2 - 4 + p^3) - (2p^3 - 9)$

$-3p^3 + 2p^2 - 5p + 20$

2) $(7r^4 + 6r^2 + 5) - (9r^4 - 3 + 2r)$

$-2r^4 + 6r^2 - 2r + 8$

3) $(7 - 3s^3) - (5s^3 - 9)$

$-8s^3 + 16$

4) $(6b^4 + 9b^2) + (3b^3 - 5b - 4b^4)$

$2b^4 + 12b^3 - 5b$

5) $(9 + 2x^2 - 7x^4) + (6x - 3x^4 - 5)$

$-10x^4 + 2x^2 + 6x + 4$

6) $(2 + 6x^2) - (7x^3 + 9 - 3x^2) + (5 + 4x)$

$-7x^3 + 9x^2 + 4x - 2$

7) $(3x^4 + 4) + (8 + 9x^3 - 7x^4)$

$-4x^4 + 9x^3 + 12$

8) $(8y^2 - 5y - 4) + (6y - 7) + (9y^4 + 3y^2 - 2y)$

$9y^4 + 11y^2 - 1y + -11$

9) $(3 - 2p^3 - 5p^4) + (7p^4 + 6p^2 - 9) + (p^3 + 4p^2 - 8)$

$2p^4 - p^3 + 10p^2 - 14$

10) $(9 + z^4 + 7z^5) - (3z^5 - 2 + 5z^4) - (8 - 6z + 4z^4)$

$4z^5 - 8z^4 + 6z + 3$

KEY CONCEPTS:

Learn to identify the types and degree of polynomials and how to add, subtract and multiply monomials, binomials, and polynomials.

1. (Numbr of Terms and Degeres) - The type of polynomial is identified by the number of terms. Each type can be further described by degrees.

Monomials have one term. e.g 21, xy^2, x etc.
Binomials have two terms. e.g $x + 1$, $5 + xy^2$, $x - y$ etc.
Polynomials have many terms. e.g. $x^2 + 2x + 1$, $x^3 + 2x^2 + x - 5$ etc.

a. The degree of a single variable polynomial is the number of the variable's highest exponent.
b. $x^2 + 2x + 1$ is a 2nd degree polynomial known as a "quadratric".
c. $x^3 + 2x^2 + x - 5$ is a 3rd degree polynomial known as a"cubic".
d. $x^4 + 2x^2 + x - 5$ is a 4th degree polynomial known as a"quadric".
e. The degree of a multi variable polynomial is the sum of each variable's highest exponent.
f. $x^4 + 2y^2 - z - 5y$ is a 7th degree polynomial; 4 for the x-variable, 2 for the y-variable, and do not forget the implied exponent 1 for the z-variable.

2. Multiply monmials, binomial. and polynomials.

a. **Monomial × Binomial**

e.g $x(5 + y) = 5x + xy$

b. **Binomial × Binomial** (FOIL method)

e.g $(x - 2)(x - 6) = x^2 - 8x + 12$

c. **Binomial × Polynomial**

e.g. $(x - 2)(x^2 - 8x + 15) = x^3 - 8x^2 + 15x - 2x^2 + 16x - 30$
$= x^3 - 10x^2 + 31x - 30$

3. Add and subtract monmials, binomial. and polynomials. Expand the expression to eliminate parentheses then combine like terms.

a. $x^2 - a^2 + 5x^2 - 4a^2 = 6x^2 - 5a^2$ ...combine like terms
b. $x^2 - a^2 - (5x^2 - 4a^2) = x^2 - a^2 - 5x^2 + 4a^2$
$= -4x^2 + 3a^2$ first expand the expression to eliminate parentheses then...combine like terms