Name _____ Date _____ Class _____

LESSON 6-2

Practice B

Multiplying Polynomials

Find each product.

1. $4x^2(3x^2 + 1)$

2. $-9x(x^2 + 2x + 4)$

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

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

5. $-5m^3(7n^4 - 2mn^3 + 6)$

6. $(x + 2)(y^2 + 2y - 12)$

7. $(p + q)(4p^2 - p - 8q^2 - q)$

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

Expand each expression.

9. $(3x - 1)^3$

10. $(x - 4)^4$

11. $3(a - 4b)^2$

12. $5(x^2 - 2y^3)^3$

Solve.

13. A biologist has found that the number of branches on a certain rare tree in its first few years of life can be modeled by the polynomial $b(y) = 4y^2 + y$. The number of leaves on each branch can be modeled by the polynomial $l(y) = 2y^3 + 3y^2 + y$, where y is the number of years after the tree reaches a height of 6 feet. Write a polynomial describing the total number of leaves on the tree.

LESSON 6-2

Practice A

Multiplying Polynomials

Find each product.

1. $2x(x^2 + 4)$

$= 2x \cdot \underline{x^2} + 2x \cdot \underline{4}$

$2x^3 + 8x$

2. $3m(2 - m^3)$

$= 3m \cdot \underline{2} - 3m \cdot \underline{m^3}$

$6m - 3m^4$

3. $6p(p + 7)$

$6p^2 + 42p$

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

$x^3 + 3x^2 - x$

5. $2x(2x^2 - 5x + 6)$

$4x^3 - 10x^2 + 12x$

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

	x^2	$2x$	-1
x	x^3	$2x^2$	$-x$
-3	D	E	F

a. $D = \underline{-3x^2}$ **b.** $E = \underline{-6x}$ **c.** $F = \underline{3}$

d. $D + E + F = \underline{-3x^2 - 6x + 3}$

e. $(x^3 + 2x^2 - x) + (D + E + F) = \underline{x^3 - x^2 - 7x + 3}$

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

$= x(\underline{x^2}) + x(\underline{3x}) + x(\underline{-2}) - 1(\underline{x^2}) - 1(\underline{3x}) - 1(\underline{-2})$

$x^3 + 2x^2 - 5x + 2$

8. $(x + 3)^3$

$= (x + 3)(\underline{x + 3})(\underline{x + 3})$

$= (x + 3)(\underline{x^2 + 6x + 9})$

$x^3 + 9x^2 + 27x + 27$

9. $(x - 5)^3$

$= (x - 5)(\underline{x - 5})(\underline{x - 5})$

$= (x - 5)(\underline{x^2 - 10x + 25})$

$x^3 - 15x^2 + 75x - 125$

Solve.

10. Kevin lives on a city block that has a perimeter of $w - 2$ miles. Each day he runs around the block 3 times and then runs to the high school, which is an additional 2 miles. How many miles does Kevin run in d days?

$3wd - 4d$

LESSON 6-2

Practice B

Multiplying Polynomials

Find each product.

1. $4x^2(3x^2 + 1)$

$12x^4 + 4x^2$

2. $-9x(x^2 + 2x + 4)$

$-9x^3 - 18x^2 - 36x$

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

$-6x^5 - 42x^4 + 24x^3 - 18x^2$

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

$-4x^6 + 10x^5 - 7x^4 + 2x^3$

5. $-5m^3(7n^4 - 2mn^3 + 6)$

$-35m^3n^4 + 10m^4n^3 - 30m^3$

6. $(x + 2)(y^2 + 2y - 12)$

$xy^2 + 2xy - 12x + 2y^2 + 4y - 24$

7. $(p + q)(4p^2 - p - 8q^2 - q)$

$4p^3 - p^2 + 4p^2q - 2pq - 8pq^2 - q^2 - 8q^3$

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

$2x^2y^2 + 6x^3 + xy^3 + 3x^2y - y^3 - 3xy$

Expand each expression.

9. $(3x - 1)^3$

$27x^3 - 27x^2 + 9x - 1$

10. $(x - 4)^4$

$x^4 - 16x^3 + 96x^2 - 256x + 256$

11. $3(a - 4b)^2$

$3a^2 - 24ab + 48b^2$

12. $5(x^2 - 2y^3)^3$

$5x^6 - 30x^4y + 60x^2y^2 - 40y^3$

Solve.

13. A biologist has found that the number of branches on a certain rare tree in its first few years of life can be modeled by the polynomial $b(y) = 4y^2 + y$. The number of leaves on each branch can be modeled by the polynomial $l(y) = 2y^3 + 3y^2 + y$, where y is the number of years after the tree reaches a height of 6 feet. Write a polynomial describing the total number of leaves on the tree.

$8y^5 + 14y^4 + 7y^3 + y^2$

LESSON 6-2

Practice C

Multiplying Polynomials

Consider the expansion of $(x + y)^n$.

1. How many terms does the expression contain? $n + 1$

2. What is the exponent of x in the first term? n

3. What is the exponent of y in the first term? 0

4. What is the sum of the exponents in any term of the expansion? n

Find each product.

5. $-y^3(10x^2 + 4xy - y^2)$

$-10x^2y^3 - 4xy^4 + y^5$

6. $(2a - b)^3$

$8a^3 - 12a^2b + 6ab^2 - b^3$

7. $5(h - 2)^4$

$5h^4 - 40h^3 + 120h^2 - 160h + 80$

8. $(2m^2 + n)(3n^2 + 6mn - m^2)$

$-2m^4 + 12m^3n + 6m^2n^2 - m^2n + 6mn^2 + 3n^3$

9. $\left(\frac{1}{3}x + 4\right)^3$

$\frac{1}{27}x^3 + \frac{4}{3}x^2 + 16x + 64$

10. $(4x - 5)(2x^5 + x^3 - 1)$

$8x^6 - 10x^5 + 4x^4 - 5x^3 - 4x + 5$

11. $(a^3 + a^2b^2)(b^4 + a^2)$

$a^5 + a^4b^2 + a^3b^4 + a^2b^6$

12. $(k^4 + k^3 + 12)(k^2 - k - 9)$

$k^6 - 10k^4 - 9k^3 + 12k^2 - 12k - 108$

Solve.

13. The momentum of an object is defined as its mass m multiplied by its velocity. As a certain experimental aircraft burns fuel, its mass decreases according to the polynomial $m(t) = 3000 - 0.1t^2 - 4t$, where m is in kilograms and t is measured in minutes since takeoff. Under the force of the engines, the velocity of the aircraft increases according to the function $v(t) = 0.001t^3 + 0.01t$, where v is in kilometers per second. What is the momentum of the rocket?

$-0.0001t^5 - 0.004t^4 + 2.999t^3 - 0.04t^2 + 30t$

LESSON 6-2

Reteach

Multiplying Polynomials

Use the Distributive Property to multiply a monomial and a polynomial.

Think: $k(x + y + z) = kx + ky + kz$

Multiply: $2ab^2(3a^2b - 4ab^2 - b^3)$.

$2ab^2$ is a monomial. $3a^2b - 4ab^2 - b^3$ is a polynomial.

$2ab^2(3a^2b - 4ab^2 - b^3)$

$2ab^2(3b^2b) + 2ab^2(-4ab^2) + 2ab^2(-b^3)$ *Distribute $2ab^2$.*

$2(3)(a \cdot a^2)(b^2 \cdot b) + 2(-4)(a \cdot a)(b^2 \cdot b^2) + 2(-1)(a)(b^2 \cdot b^3)$ *Group like terms.*

$6a^3b^3 - 8a^2b^4 - 2ab^5$ Multiply.

Remember: Add the exponents of like bases to multiply.

Find each product.

1. $4x^2(x^2 + 2x - 3)$

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

$4x^2(x^2) + 4(2)(x^2 \cdot x) + 4(-3)x^2$

$4x^4 + 8x^3 - 12x^2$

2. $c^2d^2(3c^2 - cd + 7d^2)$

$c^2d^2(3c^2) + c^2d^2(-cd) + c^2d^2(7d^2)$

$3(c^2 \cdot c^2)(d^2) - (c^2 \cdot c)(d^2 \cdot d) + 7c^2(d^2 \cdot d^2)$

$3c^4d^2 - c^3d^3 + 7c^2d^4$

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

$5xy^2(x^3) + 5xy^2(4x^2) + 5xy^2(2)$

$5(x \cdot x^3)y^2 + 5(4)(x \cdot x^2)y^2 + 5(2)xy^2$

$5x^4y^2 + 20x^3y^2 + 10xy^2$

4. $3a^2b^2(8a^2 - 2ab - b^2)$

$3a^2b^2(8a^2) + 3a^2b^2(-2ab) + 3a^2b^2(-b^2)$

$3(8)(a^2 \cdot a^2)b^2 + 3(-2)(a^2 \cdot a)(b^2 \cdot b) + 3(-1)a^2(b^2 \cdot b^2)$

$24a^4b^2 - 6a^3b^3 - 3a^2b^4$

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

$2y^3(y^2) + 2y^3(-9y) + 2y^3(4)$

$2(y^3 \cdot y^2) + 2(-9)(y^3 \cdot y) + 2(4)y^3$

$2y^5 - 18y^4 + 8y^3$

6. $x^2y^2(4x^2 + 7y)$

$x^2y^2(4x^2) + x^2y^2(7y);$

$4(x^2 \cdot x^2)y^2 + 7x^2(y^2 \cdot y)$

$4x^4y^2 + 7x^2y^3$